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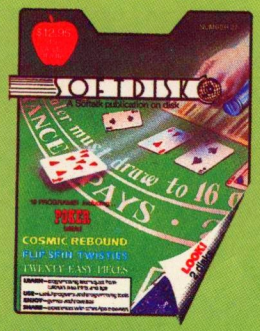

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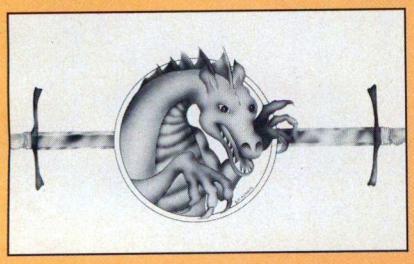

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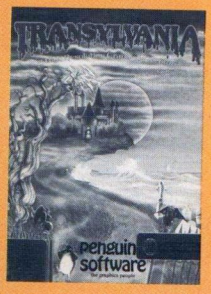

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Playing the Bits

What's the *real* reason you bought your computer? Programming, word processing, financial analysis, you say? Come on. . . you're not talking to the Internal Revenue Service—or to your budget-conscious spouse. We're all sympathetic friends here, so you might as well 'fess up.

Now doesn't it feel better to admit your passion for computer games? Sure, you probably have to keep up the facade of doing a lot of *serious* stuff to justify your investment in all that equipment. We all do. But when there's free time (and RAM) available, few activities are more satisfying than matching wits and reaction speed against a computer.

Choosing Your Game

Computer games can be grouped into about four major classifications. The first category consists of computerized versions of common, non-computer games, including everything from athletics (table tennis, baseball, track and field) to card and board games (bridge, chess, Monopoly). A non-computist might not understand why anyone would prefer these electronic representations over the real thing. Certainly, the physical fitness benefits of actually playing basketball or ping-pong cannot be duplicated via a CRT. Yet, when a human partner for bridge or chess is not available, the computer can provide a satisfactory substitute.

The second type of computer game is the quarter-eating variety found in arcades. Although these are reminiscent of old-fashioned pinball machines and carnival games, the unusual sounds and graphics made possible by microchips have created forms of experience that were previously unknown. Games in this category generally reward quick eye-hand coordination, take only a few minutes per play, and are too often characterized by themes of stylized violence (shoot-'em-down or gobble-'em-up).

The third group, referred to as "adventure" or "quest" games, has no single, clear analogy in pre-computer culture. Acting as sort of an interactive storyteller, each of these programs creates an elaborate fantasy environment that is gradually revealed as the player tries to reach an elusive goal—finding a hidden treasure, defusing a nuclear bomb, or rescuing a damsel in distress. The player's input may take the form of such cryptic phrases as "GO WEST", "CLIMB TREE," or "SHOOT MONSTER." The computer then responds with new information about further clues or, occasionally, unexpected disasters. These games exercise intellectual problem solving skills rather than response speed, and can last for hours, days, or even months. Some are designed in the style of Dungeons and Dragons, with customized characters and frequent battles. Although the older adventure games consisted only of text, many newer ones add graphic illustrations to the screen.

The fourth category, educational games, includes programs that purport to teach academic skills while involving the student in one of the game types described above. Although some educators object to a "sugar-coated" approach, good quality educational games are becoming increasingly popular with both teachers and parents.

In This Issue

Our approach to the theme of games, in typical *Call -A.P.P.L.E.* fashion, is to look at more than the pure amusement aspects. Following our lead article by Jonathan Post, **Videogame Aesthetics—The Serious Side of Fun**, we examine an elaborate adventure game in **Wizardry** by Monte Schulz. Next come two technical articles that dissect the disk structures of these types of games: **Backdoor Wizardry** by George T. Miller, Jr., and **Ultima III Player Enhancer** by Robert Ursillo. **Computer Chess Champ** by Art Ude reveals the outcome of a hard-fought tournament between two chess-playing programs on the Apple.

Reviews of various types of games permeate the rest of our magazine, along with other features for those of you who have "better" things to do with your time. For example, you might want to pay special attention to **Poor Man's Integrated Software Package** by Tom Militello, **Graphics Toolkit—Part 3** by Randi Rost, and a useful article about **The *//e* 80 Column Card** by Cecil Fretwell.

In the meantime, as they say in the oldest, continuing, quadrennial competition—*let the games begin!*

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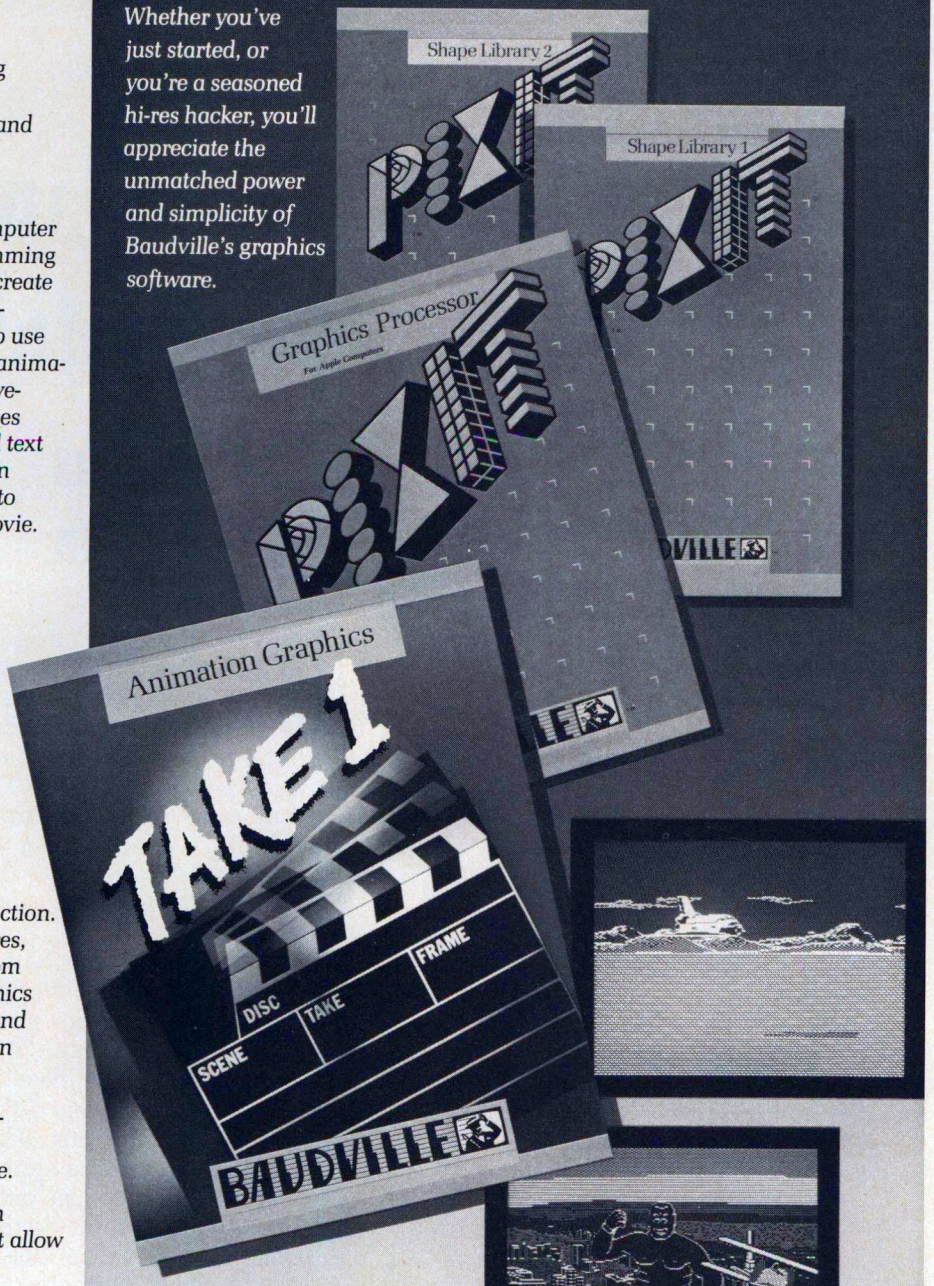

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Videogame Aesthetics

The Serious Side of Fun

Jonathan V. Post

IT WAS the beginning of the last half of the 20th century. In Cambridge, Massachusetts, the MIT whirlwind computer was demonstrating the capabilities of its cathode ray tube (CRT). The CRT, modified from radar and television display technology, was a novelty. "What good is it," people asked Professor Jay Forrester, "compared to punched tape or teletype?"

Forrester showed the output of a program called "Bouncing Ball" in which a crude circular image moved up and down in a series of lower and lower bounces, as a model of gravity and elasticity. Twenty-three years later, a program only slightly more complicated ran on a system with 73 integrated circuit chips and a screen. Allan Alcorn built the prototype at the suggestion of Nolan Bushnell—who called it *Pong*. After a generation, we had reaped the whirlwind, and found an endless stream of quarters.

Edward R. Murrow showed this wonder to the television audience of America on the December, 1951 "See it Now." Pentagon figures for an imaginary rocket were shown on Whirlwind's screen as graphs of altitude,

speed, and fuel. Twenty-eight years later Howard Delman, a former employee of Bushnell and Alcorn, drew on the heritage of Whirlwind, "Spacewar," and the Bushnell/Alcorn "Computer Space" (which sold 2,000 units) to drive a vector generator to the hit of 1979—a game called "Asteroids" where, for the first time, millions of people steered their own imaginary rockets.

The Pentagon was interested in rockets of a less imaginary nature. So was the Kremlin. The serious side of videogame war is real computer war.

More rounds of "Space Invaders" (Taito, Inc., 1978) were played by 1982 than there were people on earth. One generation was enough to bring the techniques of the laboratory to global involvement.

At the conclusion of Murrow's show, Whirlwind "sang" Jingle Bells. This was not the first computer music, but they were bits heard round the world. By the time Hal in *2001* sang "Daisy," the voice of the computer had become familiar.

In 1963, Jay Forrester's student Ivan Sutherland presented the most important Ph.D. dissertation in the history of computer graphics. Sutherland later founded Evans-Sutherland (a major graphics system for NASA and military flight simulators) and chaired the Computer Science Department at Caltech. His thesis described the "Sketchpad" system—which was the first CAD (computer aided design) system for automating the tasks of engineering drawing. The blueprint became the bitprint.

But what draws people to shove quarters in the coin slots of videogames? Do the Battlezones and Centipedes, the Asteroids and PacMan amount to no more than electronic addiction? Or are they the dawn of a new form of art? Art or frivolity—where will videogames go from here, and why?

A good summary of the videogame industry and technology appears in the IEEE magazine *Spectrum* (1982, by Tekla Perry, Carol Truxal, Paul Willich: p. 20–33). The book *Video Invaders*, by Steve Bloom (New York: Arco Publishing, Inc., 1982) is fascinating and detailed. Magazines such as *Videogames* keep up with the consumers—and the new breed of game designers.

A very interesting book by two University of Washington psychology professors, *Mind at Play : The Psychology of Videogames* by Geoffrey and Elizabeth Loftus, explains how videogames are mentally addictive due to the same psychology of "partial reinforcement schedule" that is used to condition laboratory rats to push a button for food. Still, say the Loftuses, "these games may be giving people an edge in . . . acquiring . . . computer literacy."

America's hundred or so game designers—stars in the new industry—have quite a few insights into the psychology and art of computer graphics, as well as technical talent. Talent alone will not bring the hefty royalties and accolades. What the best game designers work with includes understanding of: neuromuscular action, the aesthetics of image, and an almost military awareness of tactics and strategy.

What videogames and computer games mean to their users is a synthesis of all these considerations. What matters is the "feel" of the game, its atmosphere, its intuitive impact on the player—what Ted Nelson calls "virtuality".

As William Shakespeare puts it: "The play's the thing!"

Leonardo Da Vinci Would Have Loved

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designed by Louis Bonfiglio

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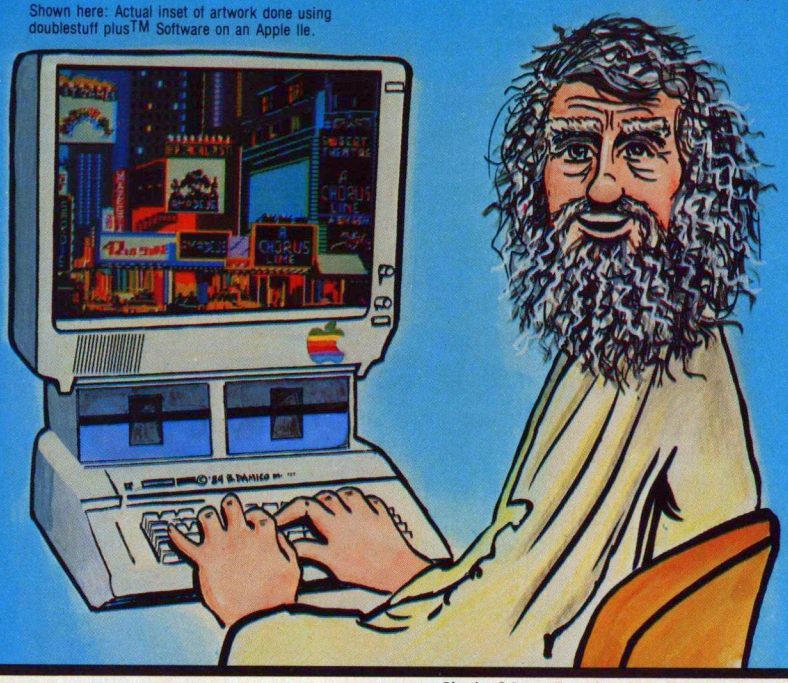

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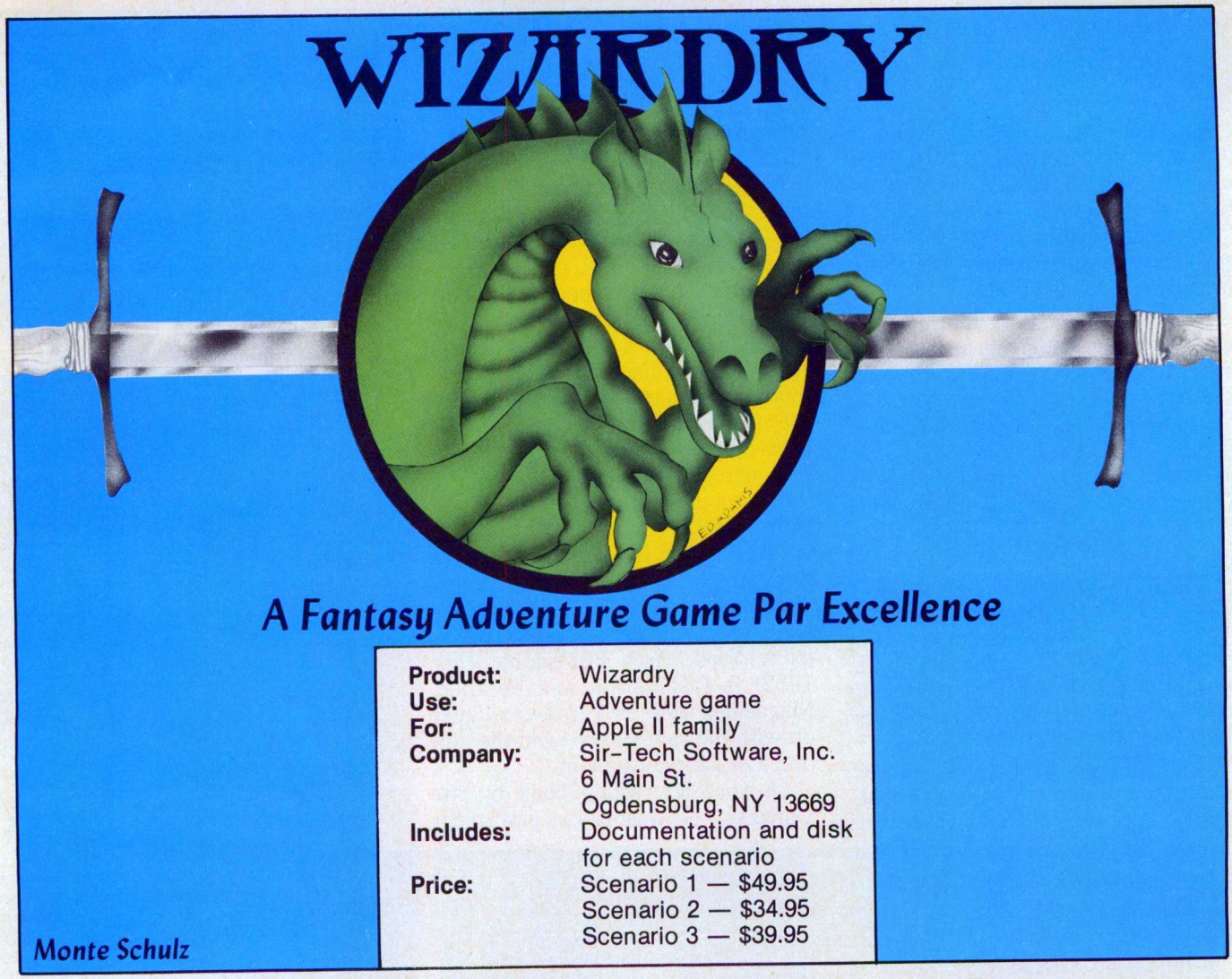

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Monte Schulz

IT HAS been three years since the first *Wizardry* scenario appeared. In that brief time thousands of game players and work-a-holics alike have spent many precious entertainment hours searching the dark passageways of a great mythical labyrinth in a place called Llylgamyn. A few of them have found their way through and have won the grudging admiration of those who have not. All speak the language of fantasy/adventuring: experience levels, hit points, enchanted items, spells, monsters and magic, characters weak and strong. Winning itself becomes almost secondary to the experience of playing because, in fact, the playing goes on long after the victory chevrons, letters, and stars are awarded.

Fantasy role-playing adventures have been around from the beginnings of microcomputer gaming. Tied to the world of "dungeons and dragons," the early games were an attempt to bring the board game onto the video screen. These games created a world where magic and fantasy play at least as great a part as logic and reason. *Wizardry* has elements of the early games, but is itself a kind of phenomenon—larger than it's predecessors, more sophisticated, more challenging and imaginative. It's popularity, measured against sales and user enthusiasm, far outdistances it's competition.

The Series

The challenge of *Wizardry* turns on the age-old theme of a quest, the seeking out of something special to bring from the dark into the light. The game is played by creating, assembling, and preparing a party of warriors and wizards, then sending them into a vast labyrinth in search of that "something special" needed desperately by the good people of Llylgamyn. In *Proving Grounds of the Mad Overlord,* the first of three *Wizardry* scenarios, the plot involves an ancient and powerful amulet stolen by the arch mage Werdna from the treasury of the Mad Overlord and stashed for safekeeping at the bottom of the ten level dungeon. In the second scenario, *The Knight of Diamonds,* a disastrous battle between the forces of good and evil in the center of Llylgamyn has caused the protective Staff of Gnilda to become lost to the people of the city. *The Legacy of Llylgamyn,* the cleverest and most subtle of the three, asks that the mountain lair of the great dragon L'kbreth be found in order to retrieve a mysterious orb taken there by the dragon at the dawn of the time. Only with the orb can the sages of Llylgamyn hope to locate the source of a series of natural disasters threatening the very existence of the Kingdom. Each quest requires characters well-skilled and versed in the martial, cartographic, and magical arts.

Preparing for the Quest

At the beginning, a party is chosen and created from

three alignments (good, neutral, evil), five races (human, elf, gnome, dwarf, hobbit), and four initial classes or occupations (ranging from basic fighters and thieves, to wizardly mages and priests). Later, as the characters grow in strength and experience, they may qualify for one of four greater classes—clever bishops, warrior samurai, great lords, and incredibly violent and malevolent ninja capable of killing any opponent with a single unaided blow.

After the characters are created and named, they are gathered together and outfitted for their expedition into the wilderness of the maze. From the Gilgamesh Tavern, where the party waits to be assembled, it is on to the business district and the notorious Boltac's Trading Post. Boltac always buys low and sells high, and the five hundred or so gold pieces with which a level one character begins will barely buy enough armor to survive the early going.

The game begins when the armor is donned and the party taken into the maze, either downward into the dungeons of *Proving Grounds* and *Knight of Diamonds* or up to the shadowy interior of L'kbreth's mountain in *Legacy*. It is dark in the labyrinth, and the myriad passages are filled with an astounding array of obstacles to discourage adventuring. There are pits, teleporters, and chutes, secret doors, revolving floors, one way windows, and complex riddles barring entry to more rooms and deeper corridors in the maze.

Moving and Mapping

Moving through these many passageways is accomplished with the toggling of four keys: "f" for forward, "r" for turn right, "l" for turn left, and "k" for kick through door. With the spell "milwa" (or its stronger incarnation, "lomilwa") in force, the maze is lighted five squares forward. Without it, only two squares in the maze can be seen ahead at any one time, a condition that creates a very real feeling of claustrophobia. Worse are the "dark areas" in the three games where no light functions at all and mapping is done either methodically by touch, or not at all.

The maze is shown as a three-dimensional representation of the dungeon as you would see it if you were actually there. Passageways recede into the darkness while side-corridors and doorways appear from time to time to the left and right, always beckoning your entry. Mapping the dungeons of the first two scenarios (and L'kbreth's mountain in the third) is a large part of the game. Without complete and accurate maps, the playing of the game becomes tedious and frustrating, and almost impossible to solve. On the other hand, accurate mapping will, after a time, lead a strong party to the end of the game. The thing to remember is that the maze is laid out on a 20x20 grid, and every square on the grid serves some purpose. The easiest way to play *Wizardry* is to march around each level, mapping and gaining experience as you go, exploring each corner of every room, entering every alcove, and kicking each wall that seems likely to have a secret door. In this way, nothing is missed on any level, and every level completed will lead you to the next. One last point: when in doubt, camp and throw directional spells. An inaccurate map is almost worse than no map at all. If you think you have hit a teleporter, if the surrounding few squares do not look right, or if you just plain forget which way you are currently facing, then cast the directional spell "dumapic" and find out for certain, particularly when exploring dark areas.

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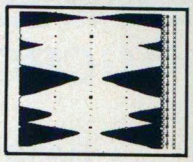

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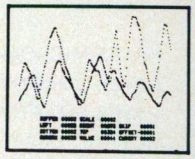

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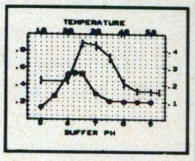

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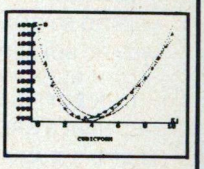

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Winning Isn't Everything

There are no weak opponents in *The Knight of Diamonds.* As advertised, thirteenth level characters will barely survive in the second scenario. Even those peculiar "fuzzballs," incredibly prolific and worth no experience points in combat, are virtually invulnerable to spells of all kinds; while the air giants of level four and the greater

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demons of the sixth level are capable of destroying the strongest of natural parties in a single pass. Survival depends as much upon strategy as it does on remembering what spells are most effective against which monsters. In other words, do not waste two "tiltowaits" and a "malikto" (the word of death) when a single "makanito" or "disspell" would have sufficed! Of course, as in real life, there are those times when the best strategy is simply to run, particularly when the demons, the evil priests, and the master ninjas make their appearance en masse. Good-by!

There is probably no single reason why *Wizardry* has become so popular, other than the fact that it has elements within it that spread it's appeal beyond the cult of D & D enthusiasts. On one level it is simply a game of search and destroy expeditions run against an incredible array of nightmarish monsters in the heart of an enormous maze. This is the game that appeals to the younger audience, a *Wizardry* for young warriors and budding superheroes. On another level, however, *Wizardry* is an intellectual exercise in patience, planning, and the organizing of both resources and skills required to unravel the great puzzle hidden by that huge maze. Either way, this game is mezmerizing and challenging in a way rivaled by few others. Any of the three scenarios can take months to solve, and half of the pleasure and frustration of the game involves accepting that fact. As a result, those who play it develop a kind of gaming attitude that allows them to discover as much about their own character as about the characters they develop in the Training Grounds of Llylgamyn.

Even cheating seems to play a part in this game. For whatever reason, perhaps it's high level of difficulty, *Wizardry* has inspired a peculiar gaming approach that allows for the use of illegal "android" parties created in the factories of special "character editing" programs. These are characters of impossible strength and abilities who wreak havoc and destruction when introduced into the three scenarios. Also, the password option was not introduced into the game for nothing. Friendships have been known to disintegrate when special items are surreptitiously transferred from one player's character to another's without prior consent. Frustrated players have been known to crack the game's code just to create artificial stairways from one level to the next. Who says this is just a game?

Conclusion

Every software company claims that its games are the most wonderful on the market. Unfortunately, a great number of them are wrong. Not many of the available computer games are really good. Most follow some formula laid down by predecessors, and a few are simply uninspired rip-offs of earlier programs. It seems that few people developing games today possess a truly innovative imagination, and the result is that many games are dull and repetitious while others are just badly executed.

As thousands of Dungeons and Dragons fans can attest, *Wizardry* is not a new concept. It builds on what has gone before, but it has done so in a special way that is new and imaginative. What authors Andrew Greenberg and Robert Woodhead have created is a world wherein the player can inject his or her imagination and let it run endlessly, expedition after expedition, scenario after scenario. Is it fun to play? Is it worth the money? Definitely, on both counts. These games from Sir-Tech offer a truly exceptional value for the money.

Backdoor Wizardry

George T. Miller, Jr.

ARE YOU one of the poor unfortunate souls, like myself, who are absolutely hooked on *Wizardry*, who burn the midnight oil by the fifty gallon drum trying to learn all of its secrets, not content with simply playing and pulling hair (a luxury I can no longer afford)? Let me share some of the secrets of entering through the "back door" and analyzing the game by examining and changing the player files, then observing the results during actual play. The work is often slow but the rewards can be gratifying, with the assurance that the only threat to the immortality of your heroes is physical damage to your disk. Duplicate backups can negate even that threat.

You may have read the earlier articles about *Wizardry* in *Call -A.P.P.L.E.* by Art Ude (August 1983) and Christopher Williams (December 1983). Another informative article and excellent program, "Wizfix" by Kerry J. Lantz appeared in *InCider*. The program worked beautifully and really got me interested in the inner workings of *Wizardry*. It remedied my fatal mistakes with the monsters. One of the best features was the safety of working only with the backup disk and never writing to the scenario disk—a disaster waiting to be triggered by Murphy's Law.

Then came scenario No.3,"The Legacy of Llylgamyn"(LOL)... Super!! Unfortunately, "Wizfix" became useless in the Trading Post, and most of the legitimate ways for creating high level bishops and transferring loaded characters from duplicate scenario disks have been rendered null and void by the diabolical geniuses at Sir-Tech. The only way to beat the program is by the back door—altering the data in the character files. Published information on previous scenarios was incomplete and not entirely applicable to LOL.

The problem...	how to obtain information on a new scenario.
The solution...	boot the disk-zapper and burn some more midnight oil.

The results... some new discoveries on the data structure of the character files plus a logical approach to analyzing any new scenario.

In the following discussion, I will refer to scenario 1 ("Proving Grounds of the Mad Overlord") as "PG," scenario 2 ("The Knight of Diamonds") as "KOD," and scenario 3 ("Legacy of LLylgamyn") as "LOL".

Zapping the Files

The essential tool is a good disk-zap program of which Watson, from Omega Microware, is my favorite. As long as you understand how to use yours safely, any of them will do the job. Watson is super-convenient and seems to be the ultimate utility in my humble opinion. It helps to have clean disks as it is easier to pick out the data from among the $00's than from among pre-existing garbage. Locksmith (also from Omega) has a useful track erase and track format utility to clean the disk before starting. Watson also has a convenient screen dump which will dump an entire sector to the printer in hex or ASCII. Printed records for comparison to detect small changes in a sea of data are invaluable when working with unknown data structures.

I will be referring to LOL here but the principles are the same for any scenario. We will prepare a special "test disk" which will make scenario jumping more efficient. It will be simpler to prepare one disk for LOL and a separate disk for PG/KOD. This is because no items in PG and KOD require a hi byte in the item code and both series start with $01 in the lo byte, while LOL requires both a hi and lo byte and the series begins with $E9 in the lo byte. Thus, switching between these two sets will require a lot of disk zapping.

The "test disk" will consist of a *Wizardry* backup disk which has twenty characters who, as a group, possess one of each item available in the scenario. This will allow you to obtain any item from a character on your disk. You can also sell them to Boltac after recording each item and its value. Thus, Boltac will have one of every salable item in stock and you will have plenty of gold to buy them back as needed (much more convenient than disk-zapping when not using a test set of characters). There is also some safety in this method, as I have found those items which have resale value but are not available after sale are often cursed and undesirable anyway.

First boot your new scenario and transfer all your favorite characters to the new scenario. If, like me, you have never bothered to work with evil or neutral characters, get out your PG scenario and create an evil team, a few

neutral characters ("go-fers" to transfer the goodies between teams), and enough extras to make a full roster. LOL is much more challenging in many respects. It is necessary to use both types of characters since there are areas of the maze forbidden to those of some alignments. In fact I discovered one area accessible to only one alignment but requiring an item for access only obtainable by the other team! You are entering a new era of cooperation between the forces of good and evil to insure survival of both!

Make certain everyone has been transferred and undergone the Rite of Passage or whatever special procedures the new scenario might require. If you are using the first three scenarios, proceed with the backups since I have done the work for you. Otherwise go to Boltac's and outfit your teams as best you can. Get the first inexpensive item on his list and the last item on the list that you can afford. (This will give you a pretty good approximation of the maximum and minimum item codes in that scenario.) Get as many other items as you can afford. Record each item purchased, the character who purchased it, and the location in his inventory. Leave the game from the edge of town and make two backup disks. The second is insurance! *Label* the disks and put your insurance in a safe place.

Organization of WIZARDRY Backup Disk

The *Wizardry* backup disk is a standard 16 sector DOS 3.3 disk which has been overwritten on the first three tracks to store the twenty backup character files, one file per sector. They are stored as shown in Table 1.

Table 1

CH	TK	SC	CH	TK	SC	CH	TK	SC
01	00	00	09	01	00	17	02	00
02	00	0D	10	01	0D	18	02	0D
03	00	0B	11	01	0B	19	02	0B
04	00	09	12	01	09	20	02	09
05	00	07	13	01	07	ID	02	07
06	00	05	14	01	05			
07	00	03	15	01	03			
08	00	01	16	01	01			

CH = Character
TK = Track
SC = Sector

The scenario identification info is stored in the first $19 bytes of Track 02, Sector 07. *Wizardry* will not normally allow you to recover backup characters to any scenario except the one which created it. There is a back door to this problem too. The ID sector is the key. To make your disk easily convertible to any scenario use the following procedure:

1) Transfer Track 02 Sector 07 of a PG backup disk to Track 02 Sector 05 of your test disk.
2) Transfer Track 02 Sector 07 of a KOD backup disk to Track 02 Sector 03 of your test disk.
3) Transfer Track 02 Sector 07 of a LOL backup disk to Track 02 Sector 01 of your test disk.
4) Transfer Track 02 Sectors 07 of future scenarios to Track 03 Sectors 00,0D,0B. . .etc., in the same order as the characters are distributed.
5) When you wish to work with a particular scenario, simply transfer the appropriate ID sector to Track 02 Sector 07 and recover the backup to the desired scenario.

Note: To use the characters in LOL the AW byte $CF must be $20, $28, or $60 to indicate the Rite of Passage. Otherwise the message "Just a Memory" will appear and you will be unable to use the character. Having these codes doesn't appear to affect these characters when used on earlier scenarios. Also the ID bytes of each item must have the proper hi bytes ($03 or $04) to be recognized and give predictable results in the program.

Organization of Character Files

Each character is allocated one sector as described above. Only the first $CF bytes are used. The remainder of the sector is an overlay of the following character in memory and can be ignored. If you wish to change the order of the characters in your roster, all that is necessary is to copy the desired character's sector into the proper roster position. Be careful to copy the character to be overwritten elsewhere or in another buffer prior to the move if you want it preserved. Using Watson, my technique is as follows:

1) To transfer the character in roster position 7 (T 00 S 03) to position 2 (T 00 S 0D) first set the buffer to $900 and read T 00 S 0D.
2) Reset the buffer to $800 and read T 00 S 03.
3) Write the buffer to T 00 S 0D.
4) Change the buffer to $900.
5) Write the buffer to T 00 S 03).

You have now swapped characters in roster positions 2 and 7. After you have recovered the backup and then backed it up again, you will note that the last $2F bytes now belong to the new following characters.

Each character data file is organized according to Table 2. The interpretation of the table is as follows:

Table 2

```
##:00:01:02:03:04:05:06:07:08:09:0A:0B:0C:0D:0E:0F:##

00|NL|NA----------------------------------------->|00
01|PL|PA----------------------------------------->|01
02|.....|RA|..|CL|..|AG-->|ST|..|AL|..|AT-------->|02
03|??.??.??.??|GO---------->|NI|..|I1.--.cu.--|03
04|id.--.lo/hi|I2.--.cu.--.id.--.lo/hi|I3.--.cu.--|04
05|id.--.lo/hi|I4.--.cu.--.id.--.lo/hi|I5.--.cu.--|05
06|id.--.lo/hi|I6.--.cu.--.id.--.lo/hi|I7.--.cu.--|06
07|id.--.lo/hi|I8.--.cu.--.id.--.lo/hi|EX---------|07
08|---->|EL-->|EL-->|CH-->|MH-->|SB------------->|08
09|->|..|M1|..|M2|..|M3|..|M4|..|M5|..|M6|..|M7|..|09
0A|P1|..|P2|..|P3|..|P4|..|P5|..|P6|..|P7|..|??|..|0A
0B|AC ->|??|........|??|..|??|..|??|..|??|..|??|??|0B
0C|.....|??|..........|??|EA|..|NO|..|UP|..|AW-->|0C
##:00:01:02:03:04:05:06:07:08:09:0A:0B:0C:0D:0E:0F:##

** Map of Character Sector on Wizardry backup disk.**
```

NL = name length
NA = name of character (flashing video characters $41 to $5A).
PL = password length
PA = password (flashing video)

Note: If name or password are changed to shorter words, the remaining characters of previous words remain and are ignored as program reads only the number of characters stored in length field.

RA = race (01–human, 02–elf, 03–dwarf, 04–gnome, 05–hobbit)
CL = class (00–fighter, 01–mage, 02–priest, 03–thief, 04–bishop, 05–samurai, 06–lord, 07–ninja)

Note: By changing the above bytes you can become anything you desire, even an evil lord or good ninja. I prefer to play the game with legitimate characters, but I have become very fond of ninjas (they require no weapons or armor and can carry lots of goodies) since using evil characters, and have used a good one experimentally with no adverse effects.

AG = age in weeks (lo/hi format) ($01/$04 will produce 20 for LOL);
ST = status (00–ok, 01–afraid, 02–asleep, 03–paralyzed, 04–stoned, 05–dead, 06–ashes, 07–lost forever)

Note: Restoring ST to $00 will correct any health problem of your hero.

AL = alignment (01–good, 02–neutral, 03–evil)
AT = attributes (Strength, IQ, Piety, Vitality, Agility and Luck) computed from data stored in these 4 bytes. My hat is off to Kerry Lantz in figuring out the math! Detailed formulae are incorporated in Wizfix, but values of 52, 4A, 52, 4A will set all six traits to their maximum of 18.
GO = gold
EX = experience points. Both are stored in six bytes of hex data reading lo to hi and left to right with increments of 1; 256; 10,000; 2,560,000; 100,000,000 and 25,600,000,000 for each unit added to their respective bytes.
NI = number of Items in inventory (0 to 8)

Note: Inventory items are never erased. This pointer is just reset to a smaller number. Restoring it to $08 will restore items even if traded, sold, or dropped during the game unless overwritten by future acquisitions.

Ix = item number x for each of the inventory items. The fields consist of 8 bytes and are subdivided as follows:

1	2	3	4	5	6	7	8
EQ	..	CU	..	ID	..	LO	HI

EQ: 01 = Equipped, 00 = Not
CU: 01 = Cursed, 00 = Not
ID: 01 = Identified, 00 = Not
LO: Lo byte of Item code
HI: Hi byte of Item code (LOL only, so far)

EL = experience level (lo–hi) Stored in duplicate in adjacent two byte fields.
CH = current hit points (lo–hi)
MH = maximum hit points (lo–hi)
SB = spell books: seven hex bytes containing fifty one binary flags (one for each spell plus a blank spell in the first position.) See Table 3.
Mx = spells left in each of the seven mage spell classes.
Px = spells left in each of the seven priest spell classes.
AC = Armor class. (AC = byte $80 – byte $81) For positive numbers $81 = 00 and for negative numbers $81 = FF.

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Table 3a

SPELL	BYTE	HEX	SPELL	BYTE	HEX	SPELL	BYTE	HEX
(dummy)	8A	01	Molito	8B	01	Zilwan	8C	01
Halito	8A	02	Morlis	8B	02	Masopic	8C	02
Mogref	8A	04	Dalto	8B	04	Haman	8C	04
Katino	8A	08	Lahalito	8B	08	Malor	8C	08
Dumapic	8A	10	Mamorlis	8B	10	Mahaman	8C	10
Dilto	8A	20	Makanito	8B	20	Tiltowait	8C	20
Sopic	8A	40	Madalto	8B	40	Kalki	8C	40
Mahalito	8A	80	Lakanito	8B	80	Dios	8C	80
Badios	8D	01	Dialko	8E	01	Badialma	8F	01
Milwa	8D	02	Latumapic	8E	02	Litokan	8F	02
Porfic	8D	04	Bamatu	8E	04	Kandi	8F	04
Matu	8D	08	Dial	8E	08	Di	8F	08
Calfo	8D	10	Badial	8E	10	Badi	8F	10
Manifo	8D	20	Latumofis	8E	20	Lorto	8F	20
Montino	8D	40	Maporfic	8E	40	Madi	8F	40
Lomilwa	8D	80	Dialma	8E	80	Mabadi	8F	80
Loktofeit	90	01	Malikto	90	02	Kadorto	90	04

To add any spells to your book, just add the hex values for the individual spells desired in each byte and write it into that byte. For example 07 in byte 90 will give you all spells in that byte 01+02+04. FF in the other bytes will give you all spells in those bytes. To use only tiltowait and dios, you would add $20 and $80 to get $A0 and write it in byte 8C of that character's file.

EA = east
NO = north
LV = level

Note: These are coordinates in maze from the maze entrance in the Castle. Set all three to $00 to restore any character lost in maze.

Table 3b

CE 01 ">" PG
CE 02
CE 04
CE 08
CE 10
CE 20 "*" LOL
CE 40
CE 80

CF 01
CF 02
CF 04
CF 08 "KD" KOD
CF 10
CF 20 R/P LOL
CF 40 "DG" KOD
CF 80

AW = awards. It seems that this is another bit-mapped area similar to the spell books. With only three scenarios and four awards the data is insufficient to be certain. This table gives the proper values to duplicate my results. This would leave plenty of area for future scenarios within the two bytes. The instructions for Table 3a can be used for experimenting. I would expect future scenarios to fill in unused bits of this table. R/P is the Rite of Passage in LOL.

I placed a full twenty characters on my test disk to facilitate the large inventory. If you do not want to create the extras, you can simply copy the sectors of your other characters into the unfilled positions on the disk and change the NL (00) field to a couple of characters less than the original. Then you can change the names with the program rather than looking up all the codes for the flashing characters. Then set each NI byte to 08. Be sure each EQ and CU byte is 00 and each ID byte is 01. (To prevent you from discovering that you are equipped with a cursed item or have an unidentified item which does nothing but enrich Boltac and waste your time.)

Before changing anything, check the item codes for all items purchased in Boltac's and record them along with the proper name of the item.

Table 4 conains the proper code for every item in the first three scenarios. (LOL requires both the lo and hi byte. The earlier scenarios seem to just ignore the hi byte but lo bytes out of range will leave blank spaces in the inventory or leave a strange item of garbage. Dropping the item seems to be the best way to clear the game of the item.)

Now place the two byte code for an item in each item of inventory for each character until all items have been assigned. I do this sequentially for ease of recording. Recover the backup to your scenario disk and then spend some time in the tavern and Boltac's to discover what you have and what it is worth. Equip your characters with any unfamiliar items to identify cursed items.(Better here than deep in the maze.) SELL THEM ALL TO BOLTAC! Now you have a ready supply of each item and plenty of gold. You can restock your characters by again recovering from the backup disk. Note: Some items are cursed for one alignment but perfectly safe for another!

If you think you will run short of gold, place a 01 in the high byte ($39) and you will be a multi-billionaire. No way you can spend it all!! Similarly a $01 in byte 90 of your character will give you the 100,000,000 experience points to gain whatever level you desire.

There are still a few locations on the character file that I haven't identified as to function. They are marked with "?." However, I think that now you have nearly every important item kept in the file. If you can discover the use of the few remaining spots I would like to hear from you.

Of course, the real fun is in the maze discovering what weird tricks they have played on your mapping ability, where the goodies are, what powers they have, and how to best handle that next monster! But now you can relax and enjoy it knowing that if you do happen to meet an untimely end at the hand of the monsters or teleport your party into solid rock, nothing is really lost. Reset your status to OK, your number of items to 8, and your coordinates back to 00 00 00. (I have found no rock within the maze on PG and feel certain that I have explored every square. However, that is not the case in KOD and LOL.)

One last tip... Although you can't transfer characters from one LOL scenario disk to another using the transfer option, there is a way. Make a duplicate scenario disk (No.2) and recover your backup disk to it. Boot your original disk (No.1) and transfer any gold or

Table 4

PROVING GROUNDS & KNIGHT/DIAMONDS

Lo/Hi	Item	Cost
01 00	Long Sword	25
02 00	Short Sword	15
03 00	Anointed Mace	30
04 00	Anointed Flail	150
05 00	Staff	10
06 00	Dagger	5
07 00	Small Shield	20
08 00	Large Shield	40
09 00	Robes	15
0A 00	Leather Armor	50
0B 00	Chain Mail	90
0C 00	Breast Plate	200
0D 00	Plate Mail	750
0E 00	Helm	100
0F 00	Dios Potion	500
10 00	Latumofis Pot.	300
11 00	Long Sword +1	10,000
12 00	Short Sword +1	15,000
13 00	Mace +1	12,500
14 00	Staff of Mogref	3,000
15 00	Scroll/Kantino	500
16 00	Leather +1	1,500
17 00	Chain Mail +1	1,500
18 00	Plate Mail +1	1,500
19 00	Shield +1	1,500
1A 00	Breast Plate+1	1,500
1B 00	Scroll/Badios	500
1C 00	Scroll/Halito	500
1D 00	Long Sword -1	1,000
1E 00	Short Sword -1	1,000
1F 00	Mace -1	1,000
20 00	Staff +2	2,500
21 00	Dragon Slayer	10,000
22 00	Helm +1	1,500
23 00	Leather -1	1,500
24 00	Chain -1	1,500
25 00	Breast Plate-1	1,500
26 00	Shield -1	1,500
27 00	Jeweled Amulet	5,000
28 00	Scroll/Badios	500
29 00	Potion of Sopic	1,500
2A 00	Long Sword +2	4,000
2B 00	Short Sword +2	4,000
2C 00	Mace +2	4,000
2D 00	Scroll/Lomilwa	2,500
2E 00	Scroll/Dilto	2,500
2F 00	Copper Gloves	6,000
30 00	Leather +2	6,000
31 00	Chain +2	6,000
32 00	Plate Mail +2	6,000
33 00	Sheild +2	7,000
34 00	Helm (Evil) +2	8,000
35 00	Potion of Dial	5,000
36 00	Ring of Porfic	10,000
37 00	Were Slayer	10,000
38 00	Mage Masher	10,000
39 00	Mace Pro Poison	10,000
3A 00	Staff/Montino	15,000
3B 00	Blade Cusinart'	15,000
3C 00	Amulet/Manifo	15,000
3D 00	Rod of Flame	25,000
3E 00	Evil Chain +2	8,000
3F 00	Neut.P-Mail +2	8,000
40 00	Evil Shield +3	25,000
41 00	Amulet/Makanito	20,000
42 00	Diadem of Malor	25,000
43 00	Scroll/Badial	8,000
44 00	Short Sword -2	8,000
45 00	Dagger +2	8,000
46 00	Mace -2	8,000
47 00	Staff -2	8,000
48 00	Dagger of Speed	30,000
49 00	Cursed Robe	8,000
4A 00	Leather -2	8,000
4B 00	Chain -2	8,000
4C 00	Breast Plate-2	8,000
4D 00	Shield -2	8,000
4E 00	Cursed Helmet	50,000
4F 00	Breast Plate+2	10.000
50 00	Silver Gloves	60,000
51 00	Evil Sword +3	50,000
52 00	Evil Sword +3	50,000
53 00	Thieves Dagger	50,000
54 00	Breast Plate+3	100,000
55 00	Lord's Garb	1,000,000
56 00	Murasama Blade	1,000,000
57 00	Shuriken	50,000
58 00	Chain Pro Fire	150,000
59 00	Evil Plate +3	150,000
5A 00	Shield +3	250,000
5B 00	Ring of Healing	300,000
5C 00	Ring Pro Undead	500,000
5D 00	Deadly Ring	500,000

LEGACY OF LYLGAMYN Only

Lo/Hi	Item	Cost
E9 03	Orb of Earithin	0
EA 03	Neutral Crystal	0
EB 03	Crystal of Evil	0
EC 03	Crystal of Good	0
ED 03	Ship in Bottle	0
EE 03	Staff of Earth	25,000
EF 03	Amulet of Air	25,000
F0 03	Holy Water	25,000
F1 03	Rod of Fire	25,000
F2 03	Gold Medalion	0
F3 03	Orb of Mhuuzfes	0
F4 03	Butterfly Knife	150,000
F5 03	Short Sword	30
F6 03	Broadsword	50
F7 03	Mace	60
F8 03	Staff	20
F9 03	Hand Axe	30
FA 03	Battle Axe	140
FB 03	Dagger	10
FC 03	Flail	300
FD 03	Round Shield	40
FE 03	Heater Shield	80
FF 03	Mage's Robes	30
00 04	Cuirass	100
01 04	Hauberk	200
02 04	Breastplate	400
03 04	Plate Armor	1,500
04 04	Sallet (helm)	200
05 04	Potion of Dios	1,000
06 04	Latumofis Oil	600
07 04	Short Sword +1	10,000
08 04	Broadsword +1	10,000
09 04	Mace +1	10,000
0A 04	Battle Axe +1	12,500
0B 04	Nunchaka	15,000
0C 04	Dagger +1	10,000
0D 04	Kantino Scroll	1,000
0E 04	Curiass +1	3,000
0F 04	Hauberk +1	3,500
10 04	Breast Plate +1	4,000
11 04	Plate Armor +1	5,000
12 04	Heater +1	2,500
13 04	Bascinet (helm)	1,000
14 04	Iron Gloves	2,500
15 04	Badios Scroll	1,000
16 04	Halito Potion	1,000
17 04	Short Sword -1	1,000
18 04	Broadsword -1	1,000
19 04	Mace -1	1.000
1A 04	Dagger -1	1,000
1B 04	Battle Axe -1	1,000
1C 04	Margaux's Flail	1,000
1D 04	Bag of Gems	100
1E 04	Wizard's Staff	6,000
1F 04	Flametongue	15,000
20 04	Round Shield -1	2,000
21 04	Cuirass -1	2,000
22 04	Hauberk -1	2,000
23 04	Breast Plate -1	2,000
24 04	Plate Armor -1	2,000
25 04	Sallet -1	2,000
26 04	Sopic Philtre	2,500
27 04	Gold Ring	10,000
28 04	Salamander Ring	15,000
29 04	Serpent's Tooth	15,000
2A 04	Short Sword +2	20,000
2B 04	Broadsword +2	20,000
2C 04	Battle Axe +2	20,000
2D 04	Ivory Dagger (G)	15,000
2E 04	Ebony Dagger (E)	15,000
2F 04	Amber Dagger (N)	15,000
30 04	Mace +2	20,000
31 04	Mithril Gloves	6,000
32 04	Dialko Amulet	8,000
33 04	Cuirass +2	6,000
34 04	Heater +2	6,000
35 04	Displacer Robes	12,000
36 04	Hauberk +2	8,000
37 04	Breast Plate +2	10,000
38 04	Plate Armor +2	14,000
39 04	Armet (helm)	8,000
3A 04	Wargan Robes	2,000
3B 04	Giant's Club	20,000
3C 04	Blade Cusinart	15,000
3D 04	Shephers's Crook	22,500
3E 04	Unholy Axe	22,500
3F 04	Rod of Death	17,500
40 04	Gem of Exorcism	12,000
41 04	Bag of Emeralds	10,000
42 04	Bag of Garnets	20,000
43 04	Blue Pearl	8,000
44 04	Ruby Slippers	16,000
45 04	Necrology Rod	20,000
46 04	Book of Life	50,000
47 04	Book of Death	50,000
48 04	Dragon's Tooth	30,000
49 04	Trollkin Ring	40,000
4A 04	Rabbit's Foot	10,000
4B 04	Thief's Pick	10,000
4C 04	Book of Demons	100,000
4D 04	Butterfly Knife	500,000
4E 04	Gold Tiara (helm)	100,000
4F 04	Mantis Gloves	15,000

PROVING GROUNDS ONLY

5E 00	Werdna's Amulet	5*10^11
5F 00	Statuette/Bear	0
60 00	Statuette/Frog	0
61 00	Bronze Key	0
62 00	Silver Key	0
63 00	Gold Key	0
64 00	Blue Ribbon	0

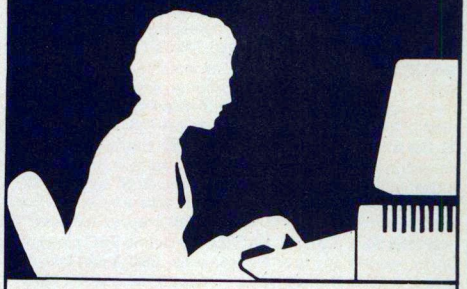
Knight of Diamonds Only

5E 00	Rod of Rising	150,000
5F 00	Amulet of Cover	120,000
60 00	Robe +3	180,234
61 00	Winter Mittens	138,344
62 00	Necklace Pro Magic	193,255
63 00	Staff of Light	60,000
64 00	Long Sword +5	70,000
65 00	Swd./Swinging	0
66 00	Priest Puncher	70,000
67 00	Priest's Mace	75,000
68 00	ShSwd./Swinging	74,674
69 00	Ring Pro Fire	250,000
6A 00	Cursed Plate +1	0
6B 00	Plate Mail +5	275,344
6C 00	Staff of Curing	100,000
6D 00	Ring of Regen	200,000
6E 00	Metamorph Ring	0
6F 00	Stone Stone	0
70 00	Dreamer's Stone	0
71 00	Damien Stone	0
72 00	Great Mage Wand	0
73 00	Coin of Power	0
74 00	Stone of Youth	0
75 00	Mind Stone	0
76 00	Stone of Piety	0
77 00	Blarney Stone	0
78 00	Amulet of Skill	0
79 00	Amulet of Skill	0
7A 00	Great Mage Wand	0
7B 00	Coin of Power	0
7C 00	Staff of Gnilda	0
7D 00	Hrathnir	0
7E 00	KOD Helmet	0
7F 00	KOD Shield	0
80 00	KOD Gauntlets	0
81 00	KOD Armor	0

Continued on P. 72

EDX/AB™...

if you are serious about programming



EDX/AB is a full screen Applesoft editor which turns the Apple II+ or //e into a serious programming tool. Full screen editing allows you to make changes to the program anywhere on the screen, unlike line editors which limit you to calling up and changing only one line at a time. In addition you can scroll through the program in both directions—forward and backward either a screenful at a time or line by line. Gone is that helpless feeling of watching the line you want roll off the screen. A simple keystroke brings it back.

EDX/AB is designed to work with ProDOS, Apple's new disk operating system, and has such "wouldn't it be nice" features as:

- full search and replace capabilities, either global or item by item.
- individual and total cross referencing for variables and GOTO, GOSUB.
- complete control of move, copy and deletion of lines (the move is a 'smart' move where all references to the moved lines are automatically adjusted).
- an active variables list which displays current values, including arrays.
- an extra fast renumber, partial or complete, that works up to five times faster than Apple's renumber.

EDX/AB does this and more. Hex to Dec, Dec to Hex is there of course, as are many additional helpful commands. EDX/AB even provides selectable auto line numbering. In all there are 25 commands, easily listed on the 'Help' screen. The commands are so simple that, after reading the manual, the 'Help' screen will be the only reference you'll need. Just two keystrokes implement any command, and they are at your fingertips all the time, so there is no repetitive loading in from disk.

At TROY SOFTWARE we felt it was time someone took the frustration out of Applesoft programming.

EDX/AB $69.95

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Circle 39 on Reader Service Card

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GLOBAL PROGRAM LINE EDITOR by NEIL KONZEN
$49.95: Includes Peeks/Pokes Chart & Tip Book #7

THE NUMBER 1 APPLE PROGRAM LINE EDITOR GPLE lets you edit 40- or 80-column Applesoft program lines *FAST* without awkward cursor-tracing or "Escape editing". Compatible with Double-Take's 2 way scrolling.

INSERT & DELETE: GPLE works like an in-memory word processor for Applesoft program lines. Simply jump the cursor to the change-point and insert or delete text. No need to trace to the end of a line before hitting Return.

GLOBAL SEARCH & REPLACE: Find any word or variable in your programs, *FAST*. For example, find all lines containing a GOSUB, or all occurrences of variable XY. REPLACE ANY VARIABLE or word with any other. For example, change all X's to ABC's, or all "Horses" to "Cows".

DEFINABLE ESC FUNCTIONS: Define ESC plus any key to perform any task. For example, **ESC-1** can catalog drive 1, or **ESC-N** could type an entire phrase or subroutine. *Anything* you want, *whenever* you want.

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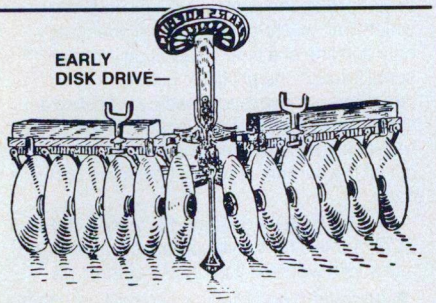


☐ BEAGLE BASIC™ (REQ. 64K)

APPLESOFT ENHANCER by MARK SIMONSEN
$34.95: Includes Peeks/Pokes Chart & Tip Book #6

RENAME ANY APPLESOFT COMMAND or Error Message to anything you want. For program clarification, encryption/protection or even foreign translation. Example:

10 POUR X=1 TO 3: ECRIVEZ "BONJOUR": ENSUITE

RAM Applesoft is *better* Applesoft! Beagle Basic replaces those obsolete cassette commands (SHLOAD, etc.), with powerful new commands that you can USE—

ELSE follows Applesoft If-Then statements, like this:

IF X=2 THEN PRINT "YES": ELSE PRINT "NO"

HSCRN reads the color of a hi-res dot for collision testing, **SWAP** exchanges variable values, **TONE** writes music without messy Pokes or Calls, **SCRL** scrolls text in *either* direction, **TXT2** lets Text Page 2 act exactly like Page 1...

GOTO AND GOSUB may precede variables, as in "GOSUB FIX" or "GOTO 4+X". Escape-mode indicated by a special ESCAPE CURSOR. Replace those awkward Graphics screen-switch pokes with one-word commands. Change your ctrl-G Beep to any tone you want. **INVERSE REM STATEMENTS** too! GPLE/Double-Take compatible.

☐ DOS BOSS™

DOS 3.3 EDITOR by BERT KERSEY & JACK CASSIDY
$24.00: Includes Peeks/Pokes Chart & Tip Book #2

RENAME DOS COMMANDS and Error Messages—DOS 3.3's "Catalog" can be "Cat"; DOS's cryptic "Syntax Error" can be "Oops" or almost *anything* you want it to be.

PROTECT YOUR PROGRAMS. Unauthorized Save-attempts can produce "Not Copyable" message, or *any* message. **List-Prevention** and other useful Apple tips and tricks. Plus one-key program-execution from catalog.

CUSTOMIZE DOS. Change Disk Volume headings to your message or title. Omit or alter catalog file codes. Fascinating documentation, tips & educational experiments.

ANYONE USING YOUR DISKS (booted or not) will be forced to use DOS formatted the way YOU designed it.

☐ DOUBLE-TAKE™ (DOS 3.3 *and* ProDOS™)

2-WAY SCROLL/MULTI-UTILITY by MARK SIMONSEN
$34.95: Includes Peeks/Pokes Chart & Tips Chart #1

2-WAY SCROLLING: Listings & Disk Catalogs scroll Up *and* Down, making file names and program lines faster to find and easier to access. Change Catalog or List scroll-direction with Apple's Arrow keys. Machine Language and Hex/Ascii dumps scroll two-ways too. All features are GPLE compatible and support 80-column display.

BETTER LIST FORMAT: Each Applesoft program statement lists on a new line for *FAST* program tracing & de-bugging (see sample below). Printer-compatible in any column-width—Great for archive printouts.

```
A$="DOGFOOD"  ← VARIABLE-DISPLAY: prints
X=3.14159       all of a program's strings and vari-
Y=255           ables with their current values.
A$: 100 200 250 ← CROSS-REFERENCE: Sorts
X: 10 20 3000   & displays line numbers where
Y: 10 40 55 60  each variable & string appears.
```

AUTO-LINE-NUMBER, instant Hex/Dec Converter, better Renumber/Append, Program Stats, Eliminate/Redefine Cursor, Free Space-On-Disk... All GPLE/Pronto compatible.

```
]LIST
10 HGR2
   : FOR Y=0 TO 191
   : POKE 228, C
   : C=C+1/9-256*(C=255)
20 REM "Double-Take optionally lists each Applesoft program statement on a new line, making program code much easier to read."
30 HPLOT 0,Y TO 279,Y
   : NEXT Y
   : POKE 2053,58
   : GOTO 10
```

2-WAY VIDEO SCROLLING

High-Speed DOS

☐ PRONTO-DOS™

HIGH-SPEED DOS/DOS-MOVER by TOM WEISHAAR
$29.50: Includes Peeks & Pokes Chart

TRIPLES THE SPEED of disk access and frees 10,000 bytes of extra programmable memory by moving DOS 3.3.

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.

(Text-files no change) **Bload language cards** at *triple speed.* Create bootable high-speed disks with the normal INIT command. Compatible with *all* commands, GPLE, Double-Take, DOS Boss, DiskQuik & most unprotected programs.

MOVE DOS 3.3 above main memory to free *10,000 bytes* of memory for your programs (64K required to move DOS).

15 EXTRA SECTORS per disk. Catalog Free-Space is displayed on the screen every time you Catalog a disk.

NEW TYPE-COMMAND ("TYPE filename") prints the contents of any Text File on-screen or to your printer.

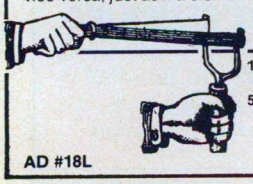
☐ DISKQUIK™ (Requires IIe with 128K)

DISK EMULATOR by HARRY BRUCE & GENE HITE
$29.50: Includes Peeks & Pokes Chart
Requires Apple IIc or IIe with EXTENDED 80-col. card)

ACTS LIKE A DISK DRIVE in Slot 3, but super-fast and silent! Enjoy many of the benefits of another drive at 1/10th the cost. Catalog with "CATALOG, S3" command. Access all kind of files in RAM with normal DOS commands.

SILENT AND FAST: Since no moving parts are involved, DiskQuik operates at super-high speeds. See to believe! Your Apple IIe's Extended 80-column Card (required) holds about half the amount of data as a 5¼" floppy!

MANY USES: For example, load often-used files like FID into RAM when you boot up, so they are always available when you need them. Copy files from RAM onto disk and vice versa, just as if a disk drive were connected to slot #3.



COMPATIBLE with all normal DOS procedures.

```
1234 TEXT: HOME: NORMAL:
     PRINT CHR$(21)
5678 R=INT(RND(1)*10): N(R)=
     N(R)+1: VTAB R+9: HTAB
     40: PRINT CHR$ (124); SPC
     (N(R)); CHR$(R+65); :
     IF PEEK(36) THEN 5678
```

AD #18L

Multi-Utilities

☐ UTILITY CITY™

21 PROGRAMMING UTILITIES by BERT KERSEY
$29.50: Includes Peeks/Pokes Chart & Tip Book #3

LIST FORMATTER prints each Applesoft program statement on a new line. For-Next Loops are indented with printer Page Breaks. A great Applesoft program de-bugger.

MULTI-COLUMN CATALOGS to your printer, with or without sector and file codes. Organize your disk library.

INVISIBLE AND TRICK catalog File Names. Put invisible functioning commands in Applesoft programs too.

21 UTILITIES TOTAL, including auto-post Run-number & Date in programs, alphabetize/store info on disk, convert dec to hex or Int to FP, protect and append programs, dump 40-column text to printer. And More.

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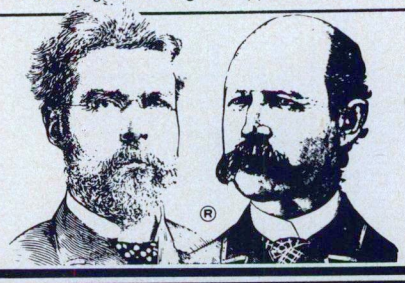

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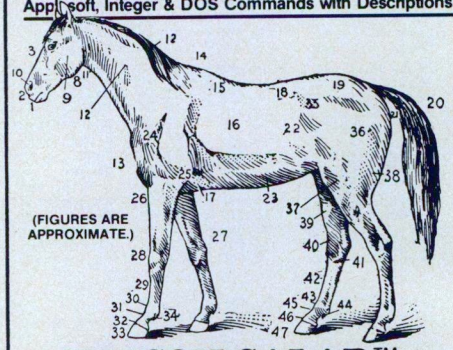

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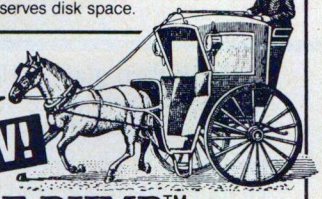
HI-RES TRICKS: Amazing stuff— any portion of a picture may be rotated, flopped, moved, inverted, superimposed, scrunched or even SAVED to disk. Saving image-portions conserves disk space.

```
10 PRINT CHR$
(ASC (CHR$ (ASC
(CHR$ (ASC ("F") /
(ASC ("P") / 8))))):
GOTO 10
```

NEW!



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SINGLE/DOUBLE HI-RES "PRINT-ANYTHING" UTILITY
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26 NEW FONTS for use with Apple Mechanic programs. Many different sizes and typestyles, both ordinary and *Artistic*. Every character—from A to Z to "★" to "□"—of every typeface—from "Ace" to "Zooloo"—is re-definable to suit your needs. All type is *proportionally spaced* for a more professional appearance. People *do* notice the difference!

Disk Librarian

NEW!

☐ FATCAT™

PERSONAL DISK LIBRARY by ALAN BIRD
$34.95: Includes Peeks & Pokes Chart

MULTIPLE-DISK CATALOG: FATCAT reads all of your DOS 3.3 and ProDOS™ disks into one or more "Master Catalogs" that can be searched, sorted and printed. Update at any time by simply reading in new or altered disks.
ALPHABETIZE FILE NAMES: Sort your DOS 3.3 and ProDOS disk catalogs alphabetically, by file name, type, etc., to make files easier to find. Re-locate individual file names too. Find files *fast* every time you CATALOG. This feature alone is worth the price of FATCAT!
COMPARE FILES: Compare any program in memory with any other on disk. Each differing program line is called out so you can tell which is the latest version.

```
10 REM BEAGLE CARD FILE
20 HGR: HGR2: POKE 232, 120: POKE 233, 64: POKE
   16504, 7: SCALE=80: P=16: X=99: FOR R=0 TO 31:
   P=P*-1: POKE 230, 48+P
30 FOR Y=0 TO 1: ROT=ABS(64*Y-R): HCOLOR=3:
   FOR A=1 TO 25: DRAW 1 AT X+2*A, X: NEXT
40 HCOLOR=0: DRAW 1 AT X, X: ROT=32: DRAW 1:
   DRAW 1 AT X, X: NEXT Y, R
50 FOR A=0 TO 20: FOR B=0 TO 1: POKE 49237-B,0:
   X=PEEK(49200): FOR C=1 TO 6*A
60 NEXT C, B, A: GOTO 50
```

Beagle Bag!

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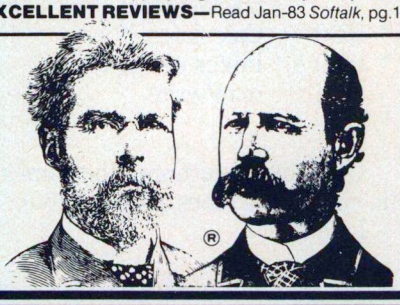
EXCELLENT REVIEWS—Read Jan-83 *Softalk*, pg.148.



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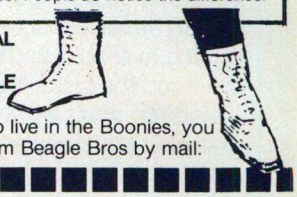

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Ultima III Player Enhancer

Robert Ursillo

ALTHOUGH Ultima III is one of my favorite adventure games, it has not always been pure, unadulterated fun. While in the process of creating and building up a character, many times did I lose one because I didn't have maximum magic points to cast the poison curing spell, or have a player die from ten groups of trolls attacking in a row. All of this made me just a little bit—yes you guessed it—frustrated!

Being almost suicidal, I whipped out my favorite sector editor and proceeded to search for the player storage tracks on the disk. When I found them, I thought: what a way to test my programming abilities and help my fellow adventure game players at the same time! Thus was created *Ultima III Player Enhancer*.

UPE, as the name states, is only for Ultima III. With it you can change almost all statistics of your Ultima III characters. Some of the categories are listed in the data statements in lines 1790 - 1830.

How to use UPE

Type the program in exactly as shown, leaving out REM statements if you like. If it does not work, check for errors in typing, especially numbers. Note: You *must* disperse your party before making any modifications or the changes will be wiped out—unless the alternate procedure described in the modifications section is followed. After saving it, run the program (you will need your Ultima III Player disk, too).

The rest of the program is self explanatory, but don't forget to save the changes you have made before you leave the program. Also, if you make an error in changing a player, you can always re-change that player's stats because the changes aren't final until you save them (Option 2, Main Menu).

How UPE works

UPE is numbered by 10's and has seven main sections. After the title page, the program jumps to the Initial Set Up to prepare the program's special needs such as hexadecimal converters and the RWTS routine.

Then it reads all of the needed data into arrays for easy access (lines 1790 -1830.) After this, UPE asks you to insert your Ultima Player disk.

Lines 1430 - 1560 read in and store the character information in memory starting at 24000.

Line:

* 1490 - POKE 47084,3 (Pokes track to read/write); POKE 47092,1 (Tells RWTS to read assigned track/sector).
* 1520 - Calculates.
* 1530 - Pokes sector to read/write.

UPE then determines the names of the characters (lines 1580 - 1660).

Line:

* 1600 - Calculates starting address of player # N's name (N=for/next variable line 1590).

* 1620 - Determines a blank as first letter of a character's name and decrees that space -EMPTY-.

UPE then goes to the Main Menu leaving the rest up to you.

Lines 490–1110 are the bulk of the program. This is where all of the changes are made. Finally, lines 1130 - 1220 are where UPE saves your cheatings—excuse me—your changes onto disk.

Customization

If you are like me and only use 4 characters, here is an option to consider. If you would only like to work with 4 players instead of 20 then make these modifications to suit those needs:

- Delete lines 1160, 1200, and 1210.
- Change line 1180 to POKE 47085,7 (sector #).
- Delete lines 1510, 1550, and 1560.
- Change line 1530 to POKE 47085,7 (sector #).
- Change line 1590 to FOR N=0 TO 3.

One advantage to this is that you would not have to disperse your party if you wanted to change your character's stats. (See Table 1). Changes can also be made to the Main Menu format but are not necessary.

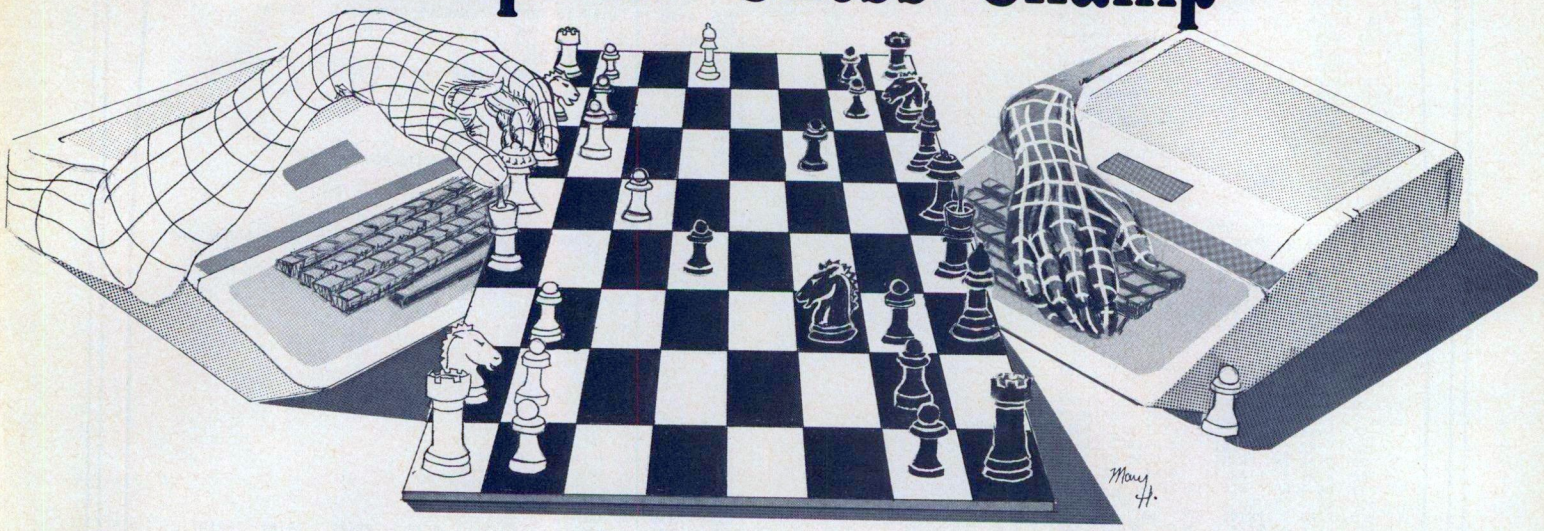
Caution

When leaving the program into Applesoft, UPE gives you just a bit of enlightening encouragement which brings me to my last thought. This program has the powerful potential to spoil all of the fun and excitement cleverly hidden on that little 5¼" magnetic medium. Please use it wisely.

```
10  HIMEM: 23999
100  REM                    **************
110  REM                    *            *
120  REM                    * ULTIMA /// *
130  REM                    * PLAYER     *
140  REM                    * ENHANCER   *
150  REM                    * BY         *
160  REM                    * ROBERT     *
170  REM                    * URSILLO    *
180  REM                    *            *
190  REM                    **************
200  GOTO 1240
210  REM                              --MAIN  MENU--

220  POKE 34,0: HOME
230  VTAB 9: HTAB 16: PRINT "--------": HTAB 16: PRINT "--------"

240  VTAB 10: PRINT "============== ROSTER ================"
250  HTAB 16: PRINT "--------"
260  FOR I = 1 TO 10
270  HTAB 3: PRINT "#";I;" ";
280  HTAB 7
290  PRINT PL$(I);
300  HTAB 22
310  PRINT "#";I + 10;" ";PL$(I + 10)
320  NEXT I
330  PRINT "======================================="
340  VTAB 1: HTAB 14: PRINT "<MAIN  MENU>"
350  PRINT : HTAB 10: PRINT ">1> EDIT A CHARACTER"
360  HTAB 10: PRINT ">2> RECORD CHANGES"
370  HTAB 10: PRINT ">3> QUIT ULTIMA P. E."
380  VTAB 7: HTAB 13: PRINT "WHICH OPTION: ";: GET A
390  ON A GOTO 410,1130,1840
400  GOTO 380
410  VTAB 7: PRINT  SPC( 39)
420  VTAB 7: HTAB 9: INPUT "EDIT CHARACTER #: ";C
430  IF C < 1 OR C > 20 THEN  GOTO 420
440  IF PL$(C) <  > "-EMPTY-" THEN  GOTO 490
450  IF PL$(C) = "-EMPTY-" THEN  HTAB 11: PRINT "SPACE #";C;" IS
     EMPTY": FOR I = 1 TO 1000: NEXT : VTAB 8: PRINT  SPC( 39)
460  VTAB 7: PRINT  SPC( 39)
470  GOTO 380
480  REM                              --CHANGES--

490  HOME : VTAB 12: PRINT "PRESS ANY KEY TO BEGIN"
500  GET A$
510  HOME : HTAB 12: PRINT "*PLAYER CHANGES*"
520  PRINT :B = 20 -  INT ( LEN (PL$(C)) / 2): HTAB B - 1: INVERSE
     : PRINT ">";: NORMAL : PRINT PL$(C);: INVERSE : PRINT "<": NORMAL

530  PRINT : PRINT "Y=YES": PRINT "N=NO": PRINT "E=EXIT"
540  VTAB 9: PRINT "+=================================+"
550  POKE 34,10
560 PSP = (C * 64) + 23936
570  HOME : INVERSE : HTAB 11: VTAB 12: PRINT "ITEM =";: NORMAL :
      PRINT " ";L$(14)
580  IF  PEEK (PSP + 14) = 255 THEN A$ = "ALL MARKS AND CARDS": GOTO
     600
590 A$ = "NOT ALL MARKS AND CARDS"
600  VTAB 13: INVERSE : PRINT "CURRENT STATUS =";: NORMAL : PRINT
     " ";A$
610  VTAB 15: HTAB 10: PRINT "CHANGE? (Y/N/E) ";: GET B$
620  IF B$ = "Y" THEN 660
630  IF B$ = "N" THEN 710
640  IF B$ = "E" THEN 220
650  GOTO 610
660  HTAB 10: VTAB 16: PRINT "A)LL OR N)ONE? ";: GET C$
670  IF C$ = "A" THEN A = 255: GOTO 700
680  IF C$ = "N" THEN A = 0: GOTO 700
690  GOTO 610
700  POKE PSP + 14,A
710  HOME : VTAB 12: HTAB 11: INVERSE : PRINT "ITEM =";: NORMAL :
      PRINT " STATUS"
720  IF  PEEK (PSP + 17) = 193 THEN A$ = "ASHES"
730  IF  PEEK (PSP + 17) = 196 THEN A$ = "DEAD"
740  IF  PEEK (PSP + 17) = 208 THEN A$ = "POISONED"
750 A$ = "GOOD"
760  VTAB 13: INVERSE : PRINT "CURRENT STATUS =";: NORMAL : PRINT
     " ";A$
770  VTAB 15: HTAB 10: PRINT "RESURRECTION? (Y/N/E) ";: GET B$
780  IF B$ = "Y" THEN 820
790  IF B$ = "N" THEN 830
800  IF B$ = "E" THEN 220
810  GOTO 770
820  POKE PSP + 17,199
830  HOME : HTAB 11: VTAB 12: INVERSE : PRINT "ITEM =";: NORMAL :
      PRINT " CLASS"
840 A =  PEEK (PSP + 23)
850 D$ = CL$(A)
860  VTAB 13: INVERSE : PRINT " CURRENT CLASS =";: NORMAL : PRINT
     " ";D$
870  VTAB 15: HTAB 10: PRINT "CHANGE? (Y/N/E) ";: GET B$
880  IF B$ = "Y" THEN 920
890  IF B$ = "N" THEN 980
900  IF B$ = "E" THEN 220
910  GOTO 870
920  PRINT "A)LCHEMIST B)ARBARIAN C)LERIC D)RUID F)IGHTER I)LLUSI
     ONIST L)ARK P)ALADIN R)ANGER T)HEIF W)IZARD"
930  VTAB 20: PRINT "TYPE FIRST LETTER OF CLASS DESIRED? ";: GET
     C$
940  FOR Z = 193 TO 215: IF  MID$ (C$,1,1) =  MID$ (CL$(Z),1,1) THEN
     970
950  NEXT Z
960  GOTO 980
970  POKE PSP + 23, ASC (C$) + 128
980  FOR I = 15 TO 63
990  HOME : IF L$(I) = "" THEN 1100
1000  VTAB 12: INVERSE : HTAB 11: PRINT "ITEM =";: NORMAL : PRINT
     " ";L$(I)
1010  VTAB 13: INVERSE : PRINT "CURRENT STATUS =";:Q =  FN HEX( PEEK
     (PSP + I)): NORMAL : PRINT " ";Q
1020  VTAB 15: HTAB 10: PRINT "CHANGE? (Y/N/E) ";: GET A$
1030  IF A$ = "Y" THEN 1060
1040  IF A$ = "N" THEN 1100
1050  IF A$ = "E" THEN 220
1060  VTAB 16: HTAB 10: INPUT "NEW VALUE? ";B$
1070 A =  VAL (B$)
1080  IF A < 0 OR A > 99 THEN 1060
1090 Q =  FN DEC(A): POKE PSP + I,Q
1100  NEXT I
1110  GOTO 560
1120  REM                              --WRITE ROUTINE--
1130  POKE 47092,2
1140  POKE 47084,3
1150 START = 24000
1160  FOR I = 8 TO 12
1170  POKE 47088,START -  INT (START / 256) * 256: POKE 47089, INT
     (START / 256)
1180  POKE 47085,I
1190  CALL 768
1200 START = START + 256
1210  NEXT I
1220  GOTO 220
1230  REM                              --TITLE PAGE--

1240  TEXT : HOME
1250  NORMAL
1260  GOSUB 1380
1270  VTAB 8
1280  HTAB 13: PRINT "+------------+"
1290  HTAB 13: PRINT "!            !"
1300  HTAB 13: PRINT "! ULTIMA /// !"
1310  HTAB 13: PRINT "!   PLAYER   !"
1320  HTAB 13: PRINT "!  ENHANCER  !"
1330  HTAB 13: PRINT "!            !"
1340  HTAB 13: PRINT "+------------+"
1350  NORMAL : FOR I = 1 TO 2000: NEXT I: PRINT : PRINT : PRINT :
      PRINT : PRINT : PRINT : PRINT "STAND BY..."
1360  FOR I = 1 TO 20: PRINT : NEXT
1370  SPEED= 255: GOTO 1430
1380  SPEED= 230: INVERSE : FOR I = 1 TO 23 STEP 2: VTAB I: PRINT
      SPC( 40)
1390  NEXT I
1400  NORMAL : SPEED= 85
1410  FOR I = 1 TO 750: NEXT I: RETURN
1420  REM                                              --READ ROUTINE-
-
1430  TEXT : HOME : GOSUB 1680: ONERR  GOTO 220
1440  GOSUB 1720
1450  HOME
1460  PRINT "INSERT PLAYER DISK, HIT A KEY";
1470  GET A$
1480  HOME : PRINT "DO NOT DISTURB"
1490  POKE 47084,3: POKE 47092,1
1500 START = 24000
1510  FOR I = 8 TO 12
1520  POKE 47088,START -  INT (START / 256) * 256: POKE 47089, INT
     (START / 256)
1530  POKE 47085,I
1540  CALL 768
1550 START = START + 256
1560  NEXT I
1570  REM                              --ROSTER SET UP--

1580  DIM PL$(20)
1590  FOR N = 0 TO 19
1600 S = 24000 + (N * 64)
1610  FOR I = S TO S + 14
1620  IF I = S AND  PEEK (S) = 0 THEN PL$(N + 1) = "-EMPTY-": GOTO
     1660
1630  IF  PEEK (I) = 0 THEN PL$(N + 1) = NA$: GOTO 1660
1640 NA$ = NA$ +  CHR$ ( PEEK (I))
1650  NEXT I
1660 NA$ = "": NEXT N
1670  REM                              --SET  UP--

1680  DEF  FN HEX(L) = ( INT (L / 16) * 10) + ((L / 16 -  INT (L /
     16)) * 16)
1690  POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76: POKE 77
     2,217: POKE 773,3: POKE 47083,0: POKE 47092,1
1700  DEF  FN DEC(K) = ( INT (K / 10) * 16) + ((K / 10 -  INT (K /
     10)) * 10)
1710  RETURN
1720  DIM L$(64): FOR I = 14 TO 63
1730  READ L$(I): NEXT
1740  DIM CL$(255):CL$(193) = "ALCHEMIST":CL$(194) = "BARBARIAN":
     CL$(195) = "CLERIC":CL$(196) = "DRUID":CL$(198) = "FIGHTER"
1750 CL$(201) = "ILLUSIONIST":CL$(204) = "LARK"
1760 CL$(208) = "PALADIN":CL$(210) = "RANGER":CL$(212) = "THEIF":
     CL$(215) = "WIZARD"
1770  RETURN
1780  REM                                --DATA--

1790  DATA        MARKS/CARDS,TORCHES,,,STRENGTH,DEXTERITY,INTELL
     IGENCE,WISDOM
1800  DATA          ,,,MAGIC PTS.,HIT PTS. (X 100),HIT PTS.(X 1),M
     AX. HIT PTS. (X 100),MAX. HIT PTS. (X 1),EXPERIENCE (X 100),
     EXPERIENCE (X 1),FOOD (X 100),FOOD (X 1)
1810  DATA        ,GOLD (X 100),GOLD (X 1),GEMS,KEYS,POWDER
1820  DATA        ,CLOTH,LEATHER,CHAIN,PLATE,CHAIN+2,PLATE+2,EXOTI
     C
1830  DATA        ,DAGGER,MACE,SLING,AXE,BOW,SWORD,2-H-SWORD,+2 AX
     E,+2 BOW,+2 SWORD,GLOVES,+4 AXE,+4 BOW,+4 SWORD,EXOTIC
1840  REM                                                --END--

1850  HOME : PRINT "TALLY HO.... AND GOOD LUCK!"
```

Continued on P. 72

Computer Chess Champ



Art Ude

FIRST came Microchess 2.0 from Personal Software. Sargon and Sargon II from Hayden followed. Datasoft issued Mychess running under CP/M, and then Odesta challenged the group with its new High-Res program, Chess 7.0. Sargon II had been the acknowledged champ, but after playing a few games with Chess 7.0,I began to wonder which version played the better and faster game. The only fair solution was to schedule a tournament; so I proceeded to set the rules, wind the clock, boot up the Apples, and go to it.

Odesta's Chess 7.0 emerged the clear winner. Not only did it play faster, but the game it played was decidedly stronger. Of the 24 games, played at various levels. Chess 7 won 13, lost 7 and drew 2. The totals do not reveal, however, that Sargon II took considerably longer to make its moves. I was about to write up the report for *Call -A.P.P.L.E's* Gaming Room when I spied an ad for Hayden's Sargon III. A phone call to Lowell, Mass. quickly produced a copy and the second tournament was underway. Having played a few games with the new Sargon III and many games with Chess 7.0, I was looking forward to a very interesting match.

There are a great many similarities in the programs. Both display a High-Res picture of the chess board. Sargon III has eliminated the oblong presentation of version II and now has a square board. Both have many levels of play and a perpetual mode that allows the program to continue its search until stopped. Will postal chess ever be the same? Both have an opening book. Sargon III boasts 68,000 moves and Odesta 7000. They allow you to save and recall games to disk, making use of one or two drives.

Both programs offer advice if requested, allow changing the playing level in mid game, switching sides, show point advantage, swap board colors, display the move they are contemplating, and provide for piece replacement and board setup in any position. Both come with some classic games already stored on disk. Chess 7 has 32 stored games and 8 problem positions, and Sargon III has 107 famous matches and about 40 problems on a second disk. Both come on locked disks, Sargon using a normal 3.3 DOS disk for game storage.

There are, however, significant differences between the games. The most obvious is in the way moves are entered. Odesta's Chess 7.0 uses only the left and right arrow and the return keys. As you press the arrow keys, the cursor moves through a menu selection on the right side of the screen. When you reach the selection you want, hitting the return key enters it. Moving the pieces is done the same way. Arrow keys to select the piece, return to enter, arrows to select placement, return to enter. It's harder to describe than use. The game paddle works just as well. Turn the paddle to move the cursor and push the game button to make the selection.

Sargon III uses the familiar algebraic notation (E2-E4) to enter moves and control key combinations to select the various options. Which system is better? That's hard to say. I think a child would find Odesta's method easier to use, however, I personally like the direct move entry that Sargon provides. Odesta is unique and innovative. Sargon is standard and familiar. You decide.

Sargon III provides for sending all the game moves or the current game position to your printer. Chess 7 does not. Chess 7 provides for displaying where any given piece will move or what various squares are attacking any given square. Sargon does not. Sargon will consider a request for a draw and both programs recognize a draw if the standard requirements are met. Chess 7 will allow you to play "blind" with only some, or none of the pieces being displayed, and has a demo game that shows off its paddle movement feature. Sargon III costs $49.95 and comes with two disks; Chess 7 costs $69.95 on one disk. $10 will secure a second program disk from Hayden while Odesta wants $7.50 and your old disk.

To determine the format of the

THE CHESS TOURNAMENT — Sargon III vs Chess 7.0

Game No.	Moves	ODESTA Color	Chess Lev.	7.0 Time	Score	HAYDEN Color	Sargon Lev.	III Time	Score
1	62	White	1	6	1	Black	1	10	0
2	25	Black	1	3	0	White	1	3	1
3	30	Black	2	5	0	White	2	9	1
4	55	White	2	6	0	Black	2	17	1
5	38	White	3	10	0	Black	3	21	1
6	29	Black	3	9	.5	White	3	17	.5
7	27	White	4	19	1	Black	4	22	0
8	47	Black	4	31	0	White	4	55	1
9	49	Black	5	56	0	White	5	95	1
10	35	White	5	39	0	Black	5	61	1
11	57	White	6	172	.5	Black	6	153	.5
12		Black	6			White	6		
13	45	Black	4	36	.5	White	3	22	.5
14	51	White	4	42	0	Black	3	27	1
15	80	White	4	35	0	Black	3	48	1
16	59	Black	4	50	1	White	3	37	0
				41	<------ Time average ---->			34	
				1.44	<--Moves / min.-->	1.75			
17	46	Black	5	75	0	White	4	50	1
18	40	White	5	53	0	Black	4	45	1
19	49	White	5	63	0	Black	4	52	1
20	54	Black	5	77	1	White	4	63	0
				67	<----- Time average ---->			53	
				.71	<--Moves / min.-->	.90			
21	40	White	6	100	0	Black	5	76	1
22	41	Black	6	111	0	White	5	73	1
23	61	White	6	186	.5	Black	5	122	.5
24		Black	6			White	5		
				132	<------ Time average ---->			90	
				.36	<--Moves / min.-->	.52			
Final average:				.86	<--Moves / min.-->	.96			
Final Scores:		Chess 7.0		6			Sargon III	16	

second tournament, I first played about a dozen games between Chess 7.0 and Sargon III at various levels. I wanted to time the actual moves against those shown in the manuals. These preliminary games revealed several things. First, both programs played excellent chess. The average player (about 700 to 900 USCF rating) will have trouble beating these programs on all but their lowest levels. Second, while Sargon played very close to the time advertised, Chess 7 varied widely. To be fair, the manual did indicate this. To be an impartial tournament, I felt that the total time allowed for all moves should be about the same. Naturally, the level of play should also be approximately equal.

Using A.P.P.L.E.'s THE Spreadsheet, I set up a template for the tournament. As the chart shows, I envisioned 24 games. The first 12 at an equal level, and then, because Sargon would take longer at these games, another 12 with Chess 7 playing one level above Sargon. Chess 7 would take longer in the second 12. The next to last line on the chart, labeled "Final average," would show the

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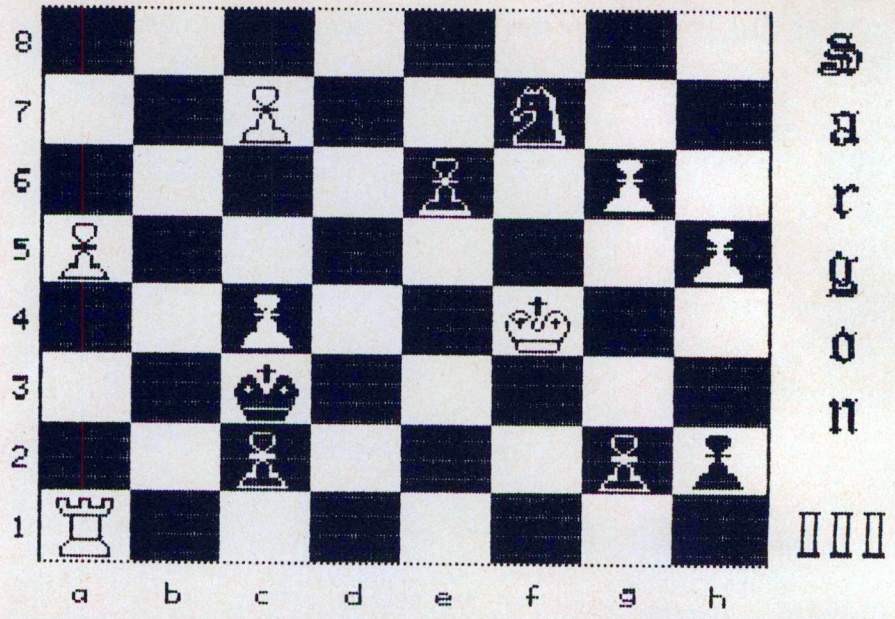
average move time for all the games played. If the tournament was a fair one, this number should be very close for both programs. The games were numbered sequentially, but were not played that way. Because of my time limitations, and to keep watch on the final average, the games were played in a random fashion with the final average always being checked to insure the match was progressing on an even keel.

As shown, games 12 and 24 were never completed. These games would have taken considerable time to finish and there was already no doubt as to the winner. The final score was 16 to 6. Sargon III, from Hayden Software, the winner and new champion! The final average reveals that my tournament was quite fair, with both programs making one move in slightly more than one minute. Sargon actually averaged a bit faster than Chess 7.

There were four draws in the tournament; two that I called and two forced by Sargon early in the game when it found itself slightly behind.



Sargon plays an especially strong end game. The diagram, a graphic example of Sargon's screen display that occurred in game #8, shows the position after move 39. Sargon plays white and moves next. Can it promote the pawn? The move it made was F7–E5. Chess 7 must reply with A1–E1 where upon Sargon can gobble up two pawns in exchange for its advanced pawn. Chess 7 blundered and took the knight with its king and Sargon proceeded to queen its pawn. I had to advance the Odesta program from level 4 to level 6 before it saw the correct move.

Both of these programs are excellent and well worth the price. Dan and Kathe Spracklen are again the authors of the Sargon program, and Larry Atkin is author of Odesta's Chess 7.0. I marvel at the expertise of these individuals in creating two outstanding programs. I found most of the games fascinating to watch. The games of levels 3 and 4 provided some especially interesting positions.

Naturally, I think Sargon III is the better buy. Two disks for $20 less and a stronger program. The ability to print the moves is also an advantage if you're a chess nut, as I am. Chess 7 should not be ruled out, however. The ease of entering the moves, simplicity of calling up all the many features, ease of disk access for saved games, and very fast play at the lower levels make it better suited for the beginning chess player than Sargon.

Sargon did have a couple of annoying quirks that, to even mention, shows my nit-picking nature. The [Ctrl–A] feature is too easy to hit as my clumsy fingers searched for the A key and, although you can recover, the game move list is lost. Sargon continues to "think" while it awaits your reply, and to see this process (which is a marvel to behold) you must access with a [Ctrl–J]. It would have been better to use one more ESC key strike as is used to call up the move list. [Ctrl–G] and L are used to save and load games and there is no second chance if you think you have called up the one and actually have the other. I lost one game this way.

There is little to fault in Odesta's program except that it makes numerous trips to the disk during the course of play. Sargon only accesses the master during the opening book or when taking back moves. I also wish Odesta had provided for printing the move list. Both programs have the disadvantage of being on locked disks.

Finally, both manuals are excellent, albeit somewhat different. Sargon provides extra information on the problems and classic games on its second disk, a reduced rate subscription to *Chess Life*, and membership in the US Chess Federation. Odesta's manual contains additional information on chess lore, strategy, and computer chess play. There's no doubt in my mind, you really should have both programs.

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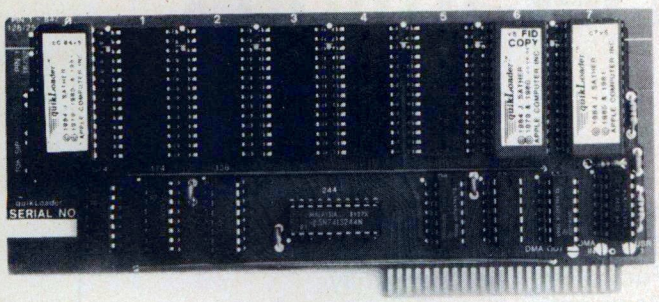

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The quikLoader is the *fastest* way to load programs. **BAR NONE!** Applesoft, Integer, or machine language programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time.

CONVENIENCE

How many times have you started to work with a frequently used program, only to find that you have misplaced the disk, or worse, had the disk damaged, or the dreaded "I/O ERROR" message flash on the screen. With the quikLoader, these nightmares can be a thing of the past. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly.

PROGRAMMING EPROMS

Putting your own programs on the quikLoader is easily done, using a separate EPROM programmer, and the instructions that we supply. For APPLESOFT, INTEGER, or single machine language files, you simply take an "image" of the program, and put it into the working array of the programmer. Add a few bytes for the overhead and catalog, and instruct the programmer to "burn" the EPROM. Plug it into the quikLoader, and your program is now **instantly** available to be cataloged, loaded, or run. No programming knowledge or experience is necessary to do this. You **will** need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

COMMERCIAL PROGRAMS

If you have a program that is valuable, it will become **more** valuable when it is instantly available to you. SOUTHERN CALIFORNIA RESEARCH GROUP is actively seeking licenses from software publishers to allow their popular programs to be made available for the quikLoader. Independent authors are encouraged to write programs suitable for the quikLoader. If the author wishes, we will market the program (with appropiate royalties), or the author can take care of all marketing. In either case, we will make known to our customers the availability of these programs.

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MEMORY CAPACITY

The quikLoader has eight sockets for EPROMS. These sockets can accommodate the standard 27XX series of EPROMS. Types supported are the 2716, 2732, 2764, 27128, 27256, and 27512. These types can be freely intermixed. The memory capacity of the quikLoader depends on the EPROMS used. For example, the 2716 can hold 2K of programs, and the 27512 can hold 64K. (Frankly, the current costs of the 27512 is prohibitive,but should come down drastically in the next year.) At this writing, the least cost-per-bit is provided by the 2764, which can hold an 8K program. Using these "chips", the quikLoader bcomes a 64K ROM. Using larger capcity EPROMS allows it to become a 128K, 256K, or even a 512K card. If more memory capacity is needed, the quikLoader operating system supports multiple quikLoaders.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 5% additional space for programs and data on your disks.

ADDITIONAL FEATURES

The quikLoader has some other handy features. The following keys, pressed in conjuction with "RESET" will perform these actions:

Z—"Cold boot"
H—Run "HELLO" program
D—Boot disk
X—Enter Mini-assembler
B—Boot only
C—Catalog disk
Q—Display catalog of programs on quikLoader
M—Drop into monitor.

To run a program from the quikLoader, bring up the quikLoader catalog (Q-reset), and the names of the programs will be displayed, along with an index letter. Pressing the index letter will instantly load and run the program. If you wish to load the program without running it, this option is available to you.

While the quikLoader catalog is being displayed, pressing the "Z" key will toggle the parameter display, showing PROM address, RAM destination address, and length.

Up to 23 programs on the quikLoader can be displayed on the screen at one time. If you have more programs, you may scroll through the catalog (either direction) for up to 256 programs.

The quikLoader is **ideal** for applications requiring a dedicated computer. Your program can be automatically loaded and run at "power-up".

ABOUT THE DESIGNER

The quikLoader was designed by Jim Sather, author of UNDERSTANDING THE APPLE][(forward by Steve Wozniak), published by QUALITY SOFTWARE (21601 Marilla Street, Chatsworth, CA 91311 (818) 709-1721).

REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

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Intellectual Decathlon

Product:	Intellectual Decathlon
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For:	Apple II family
Company:	Muse Software 347 N. Charles St. Baltimore, MD 21201
Price:	$39.95

Eric Flescher

We have all seen game shows and contests on television that test our powers of concentration, observation, memorization, eye/hand coordination and quick thinking skills. Computers can be used to test these skills in dealing with words, numbers, music and problem solving. One clever piece of software that provides such mind-stimulating challenges is *Intellectual Decathlon*.

Many games like this depend on factual content and information. However you don't have to be a genius in one or more areas to compete. All you need is a desire to improve in a series of skill oriented contests.

The events are patterned after the series of ten events in the original Olympics Decathlon. The difference is you are using a computer and the emphasis is in ten intellectual skill areas, in combination with several physical skills.

These mind-stretching competitions are:

(1) *Number Stretchers*—test the ability to memorize numbers in sequences
(2) *Notes the Notes*—test your skills in listening and identifying the tunes/sounds
(3) *Safecracker*—decipher a series of combinations that will open a safe
(4) *Mazerface*—find your way through the maze as quickly as possible
(5) *Apple Derby*—test your racing skills
(6) *Lying Digits*—test yourself with ten arithmetic problems
(7) *Matchmakers*—remembering pairs of words in a race against time
(8) *Brainblender*—a very abstract game dealing with moving across a chess-like board while trying to decipher an alphabet type code system
(9) *Instant Replay*—compare pictures and decide if they are the same
(10) *Abstrajig*—assemble the pieces of a jigsaw puzzle into a complete picture.

The ten contests may involve one person or you can play with up to five contestants. Initially, there are three options for the player(s) in the skill competitions: Practice, New, and Old game.

The first option provides a brief run through some of the games in the form of warm-up drills. The second allows you to start and later interrupt and save your game and the scores. The third recalls these saved contests, and you can pick up where you left off.

Each player keys in his/her name. The maximum total score of 21,102 is your goal. Practice makes perfect and the program allows each player to train before the initial competition occurs. Several other features help in making the program a very good one.

The program uses color and large type, which is easily readable for children. Also sound is utilized at various points for appropriate feedback and reinforcement. (Some adults may find it annoying). The directions for the most part are very clear (except for the *Brainblender* contest), and the booklet provides additional hints and guidance.

I found myself challenged in many ways by the various contests. Brainblender is the toughest one because of its abstract nature. Younger children may find it (as well as *Safecracker*) rather difficult. It took me a few minutes to discern the purpose and the complexities of playing it. Although I liked all the games, I enjoyed *Numberstretcher* and *Instant Replay* the most.

I'd highly recommend *Intellectual Decathlon* for home and school use. I feel it's an excellent value. Children, as well as adults, will be challenged by each game in a variety of ways. (It is recommended for age 6 to adults but elementary ages may have a hard time with certain games, such as *Brainblender*.)

Intellectual Decathlon demonstrates the usefulness of the computer as a tool to develop powerful intellectual skills that influence performance in the classroom, work and at home. *And* it's fun. Maybe someday you will win the gold, silver or bronze medal or reach the ultimate prize-scoring 21,102.

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61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
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121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150

SURVEY

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A ☐ *Apple II*
B ☐ *None*
C ☐ *Apple IIe*
D ☐ *Other (specify)*

What hardware product are you most likely to buy in the next 4 months?

E ☐ *Hard Disk*
F ☐ *5 megabyte*
G ☐ *10 megabyte*
H ☐ *20 megabyte*
I ☐ *8086 board for your Apple (run IBM P/C software)*
J ☐ *Apple keyboard (increase capability)*

What computer language would you likely purchase in the near future?

K ☐ MBASIC.MAC
L ☐ PASCAL
M ☐ MODULA 2
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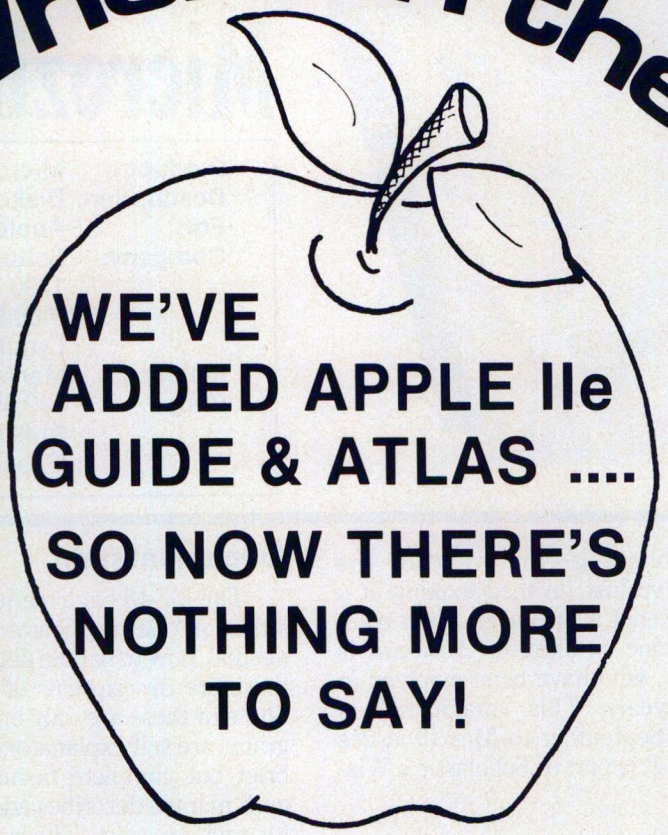

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Microzine

Product:	Microzine Vol.1, Number 2
Description:	Diskette "magazine"
For:	Apple II family
Company:	Scholastic Inc. 1290 Wall St. West P.O. Box 641 Lyndhurst,NJ 07071
Includes:	Manual and diskette
Price:	$39.95 per issue $149.00 per year subscription (6 issues).

Lee Webster

ELECTRONIC publishing—the wave of the future? (present?) I've just finished looking at a computer magazine—not a magazine *about* computers, but a magazine on diskette. *Microzine* is published by Scholastic Inc., who have been involved in educational materials for years. This "magazine" is published bi-monthly from September to May (5 issues per year) for ages 10 and up. It is part of Scholastic's Wizware software series.

Outside

The packaging is different! Each issue is in a 7" rhombus-shaped slip case. Although the case will stand upright, it won't fit in easily with a line of books on a shelf. Inside each case is a manual (also a rhombus shape), a two-sided diskette, and in some issues, a reference card. The packaging is "cute," but hardly functional.

Inside

The overall format is similar for each issue. After booting the disk you see a color logo with limited animation, and then a Table of Contents in menu form. Using the arrow keys, you move up/down the menu and the items are highlighted (inverse) when you make a selection. Pressing the RETURN key executes the option. If you want to see the credits (who developed the package, etc), you type C. If you type Q to quit, there is a message on the screen to remove the diskette and turn off the computer—a good idea. RESET reboots the system. There are programs on both sides of the disk and you are prompted when to turn it over.

For each issue there is a "What's Inside" selection which gives you a one sentence description of each of the disk's four programs. The "Computer Stuff" option allows you to change the disk drive setup, initialize a data disk, or return to the Table of Contents. There is, in most issues, a "What's Next" preview of the next issue. Screen instructions are clear with chances to "bail out" if you change your mind.

Documentation

The 32–48 page manual has a table of contents but no index. A "Getting Started" section shows the equipment needed, how to handle diskettes, etc.—all the basics. Then there are descriptions of how to operate each program. Some of these are only one or two pages long, as the programs are self explanatory. For others, details are given in brief but complete fashion. The "Funstuff" section of each manual describes additional activities or applications for each program. These suggestions are limited but may give a teacher some ideas to build on. For those needing additional help, there is a "Wizline" phone number where you can ask a "Wizkid" for help.

Each Microzine is identified with a volume and issue number but no date—presumably to prolong shelf life.

Vol.1 No.2

Northwoods Adventure is a typical adventure program with text material and occasional pictures. The graphics were nicely created with the Penguin Software Graphics Magician package. Text screens set the plot and give descriptive material. When there are choices, they are listed in a box on the screen. In some cases, it is necessary to move your character around on a plan-view map of the location (using the I,J,K, and M keys on the][+). Although the graphics are in color you can use a black and white monitor, but you sometimes get into trouble distinguishing parts of a picture without the colors. This movement by the I,J,K,M keys is a tedious way of making a choice, in my opinion. For instance, at one point you choose which branch of a road to take but have to use these keys to move your character that way. If you go off the path (or river, etc) you get a beep and try again—no harm done. A joystick option might be good—I used the Repeat key a lot! Many of the other pictures don't really add much to the adventure. This is certainly not a classic in adventure games and doesn't have much educational value.

Melody Maker allows the user to enter music, edit it and play it back. You have two ways to configure your Apple keyboard for input: direct (in which you type an A for the A note, a B for the B note, etc.) or piano (the bottom two rows of the Apple keyboard simulate the white and

black keys of the piano). A useful separate reference card is included which shows which keys correspond to which notes. When running the program, you choose the keyboard input method, then choose whether to enter a new song or to work on an old one. You also chose the time signature (2/4, 4/4 etc.—not critical since you have to manually enter the measure bars anyway) and then you get the entry screen. At the bottom are listed all the commands available, but I also would have liked to see a message indicating which keyboard entry method you have chosen. You select the time values (eighth note to whole note) by the keys on the top row of the Apple keyboard (e.g. "1" key gives you an eighth note), then press the key for the note you want. It is drawn on the screen and the letter value is shown at the top (the line under the "Melody Maker" headline). There can be up to 200 notes per song, but only one voice—in other words, no harmony. You can have sharps but not flats. Only 13 notes show on the screen at once and the display scrolls as you enter more. During playback in entry mode, however, you only see the first 13 notes on the screen. About 2 octaves are available for your 'composition'.

This would be a useful program in an educational setting for students learning to read music notation or practicing melody development. Students should have no trouble using it with the screen instructions and the manual for assistance.

Ride the Wind is a simulation of flying a hot-air balloon. The screen instructions explain the use of the vent, envelope, burner and basket. You even get a chance to "practice" some of the movements. Control is either by keyboard or optional paddles. For example, to heat the air and make the balloon rise, press A; to use the vent to lower the balloon, press Z. This introductory, interactive tutorial is well presented. In the simulation, there are different wind speeds and directions at different heights. A graphic display shows the height of the balloon, speed, and wind direction.

The idea of the simulation is a "Hare and Hounds" race—where the Hare balloon (directed by the computer) moves across the landscape and lands. The Hound balloon(s) (one or two players) are to follow and try to land as close as possible to the other balloon (scoring points based on how close you get). To begin, the screen displays an aerial view of the landscape. The Hare balloon travels and lands; then it is your turn. A color monitor is really needed to identify everything. I found the response time of my entries limited by the speed of calculating and display—so I had to anticipate my moves. Although I've never flown a balloon, I suspect there is an element of realism here. Each game has a different map and different landing place for the Hare. I never did get the hang of it! Every time I got near the target some random "interference" came up (instructed to rise to avoid some obstacle) so I overshot the mark! I think there is some educational value to this simulation—understanding cardinal directions, relationships of elevation/speed/direction—and it is presented in a way that will keep students' interest.

WORD LADDER is a word "game" in which the screen shows one word at the bottom and another word at the top of a ladder. Your object is to start with the bottom word and by changing only one letter at a time, work up to the top word. If you get stuck, you can ask for clues, but then you lose points! Here is a word ladder from the manual:

WISE
RISE
RICE
RICH

You would be shown RICH and WISE with blanks between. You enter each trial word in between (working from bottom to top) and are told if it is wrong. Up to 3 clues per word are available. This would be a good word drill for students that should help them on vocabulary and spelling. You can also write your own ladders. The entry/edit method is simple (good prompting) and you can have up to 10 rungs per ladder and 8 letters per word. You enter your own clues (20 characters per clue). This latter part would help students think of definitions, synonyms, etc. for words.

Summary

Although the Scholastic group has a strong reputation for educational products, my reaction to this disk magazine is mixed. I'm not sure whether they are aiming it more at the educational or at the entertainment market, since both types of programs are included. Although it is advertised for ages 10 and up, I think 6th grade might be the upper limit for real usefulness. In the future we may take a look at other issues of Microzine, but for now I'd prefer to examine and purchase one issue at a time than take a subscription.

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A Toolkit for Apple Logo

Jeff Sandys

Product:	Apple Logo Toolkit and Sample Programs
Use:	To enhance the usefulness of the Apple Logo language.
Company:	Logo Computer Systems, Inc.
Includes:	Several procedures and programs, plus documentation, on 3 disks.
Availability:	Can be duplicated at Apple Logo dealers.

APPLE LOGO is a mathematical playground where abstract concepts have concrete form and problems are solved simply by defining them. Solutions are worked out quickly with Logo's easy language and can then be transferred to other problem solving systems. For example, I have used Logo to develop artifical intelligence routines for strategy games.

Many Apple Logo users have wanted utility programs to install machine code, use a note primitive for music, or just look at nodespace. Teachers have wanted a command to reset Logo's nodespace without having to reboot. The .SYSTEM command and many others are now available.

A Good Deal

To help users, Logo Computer Systems Inc. (LCSI) has released the Apple Logo Toolkit and the Apple Logo Sample Programs diskettes. These disk are available for duplication at any Apple Logo dealer. To get copies, you will need three blank diskettes and the COPYA program. LCSI has provided nice looking labels for your disks. Be sure that you copy the documentation on the flip side of the Sample Programs disk. It has eighteen text files which can be printed with the Applesoft or WPL program included. You might want to print each chapter only when needed, since the whole document is about seventy pages long.

Sampling the Sampler

The Sample Programs disk has something for everyone — thirty-five packages written by users of different ages and abilities. Many of them can be good models for beginners or jumping-off points for more advanced programmers.

All of the programs run an INFO procedure when the program is loaded. The .SYSTEM command is defined by the startup file, so your workspace can be cleared before loading the next package. Many of the packages draw pictures and some animate them with the turtle. CITY, CLOCK, and ANIMATE should inspire many users with the possibilities of turtle graphics.

There are also plenty of word programs. POSTCARDS, RANDOM. POETRY, and ARGUE are most interesting and fun to change. NAVIGATE, DYNATURTLE, and LUNAR LANDER use the keyboard to drive the turtle on the screen. A paddle or joystick could be added to these procedures. The games ANIMAL and HANOI are examples of artifical intelligence using list processing and recursion.

My favorite sample program is MONDRIAN, a procedure that imitates the famous artist's style. It draws horizontal and vertical black lines on a white background, and adds a few colored rectangles using random numbers.

Tinkering With the Toolkit

The Apple Logo Toolkit disk has a wealth of useful procedures in its sixty Logo files. These procedures were written by the LCSI staff, and some of them appear in the Apple Logo Reference Manual. Many files are small packages of tools. By saving related procedures in small files it is easy to load just the tools needed.

The larger files are program packages. The Toolkit also has children's programs and a picture disk program in Applesoft.

The PICTURE program is used as the HELLO program for the picture disk. After creating a picture with Logo, boot the picture disk using .PRINTER 6. The picture program will run and the Logo picture can be saved to disk or dumped to a printer. The program has drivers for many printers including Epson, Star Micronics, Integral Data Anadex, Centronics and others. After the picture is saved or printed Logo can be rebooted.

Pictures can be printed from inside Logo with an interface. The Microbuffer II will dump a picture with:

```
.PRINTER 1
(PRINT CHAR 9"GDR)
.PRINTER 0
```

Some interfaces use moniter ROM calls that are not supported in Logo. Procedures in the Toolkit for the GRAPPLER, PKASO, and SILENTYPE interfaces have some special deposits to make these boards friendly.

Something for the Kids

Three programs on the Toolkit disk are for children; TEACH, ZOOM, and TEXTPRO. The program TEACH saves your interactive instructions to make them into a procedure. ZOOM is a single key program that lets younger children make drawings. TEXTPRO is a mini text editing and formatting package. It uses the resident editor for familiarity and there are twelve embedded format codes defined. The documentation suggests as a learning exercise that you add your own special format commands. While the program is hard pressed to process over a screenful of text, it may be just right for a budding wordsmith.

Redefinitions for the Terrapin and the Tasman floor turtles lets Apple Logo control these robots. Procedures are provided to scale the motion of the turtles and to make the Tasman turtle speak. A similar set of redefinitions and procedures interface Apple Logo with a Houston Instruments Hiplot or a Radio Shack Four Color Plotter. The documentation details the use of these packages.

Programming Aids

The many small packages of tools can be used in your programs. The LOOPS package defines the conditional loops WHILE and UNTIL, and your favorite counting loop, FOR. The file SET.TOOLS includes UNION, INTERSECTION and other set operations for use on words or numbers. Procedures for ABSolute value, MAXimum, MINimum, EXPonent, and eXclusive OR are defined with the NUMBERS tools. SORT can put a list of numbers in order. The tool ERPROPS is handy for deleting property lists that do not get erased with the ERALL command.

The debugging tools are MAP, STEP, and TRACE. MAP runs a procedure with a list of inputs. For example the command MAP "SQUARE [10 20 30 40] will draw four squares of the sizes indicated. MAPCAR is a similar routine for procedures that have out-

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put. STEP redefines a procedure such that it prints each line of code as it is executed, then waits for a key press. UNSTEP restores the procedure to its original form. TRACE works the same way except it only shows the name and parameters of called procedures.

Some of the procedures on the Toolkit disk use trick deposits. The GR.SWITCH allows drawing on the graphics screen while the textscreen is displayed. IBM.8TH.BIT alters Logo so it will send the high bit to IBM printers. TEXTLOAD changes Logo so the text in procedures is not saved in nodespace. Textpro and the assembler use this trick. PROCLOAD restores Logo to its regular operation. These procedures run when loaded and then delete themselves. The startup value makes these types of files possible.

Graphic tools include a program that plots functions and commands like MOVETO and LINE. The LOWRES package defines PUTTILE, and CLEAR that are used by two demo programs. HIRES.TEXT is impressive with its GOTOXY cursor movement and SHOWLIST print commands. This program uses a property list to store the bitmaps of each letter and a list of screen row addresses to quickly paint each letter. The procedures are short and demonstrate a use of property list.

For the Ears

The NOTE primitive is defined in the MUSIC package. This new primitive has two arguments, pitch and duration. NOTE 60 425 plays middle C for one second. Most of the range is well tempered with a 440 Hertz A note. The highest pitch at 110 is a rest and pitches below 20 get rough on the Apple speaker. COMPOSE, PLAY, and KEYBOARD procedures are part of the music package. These programs turn the keyboard into a three octave organ with editing features. The composition is saved as two variables TUNE and BEAT. The NOTE primitive is a much appreciated feature. Recursive procedures and list processing make Logo an ideal language to study music.

The note primitive is made possible with the INSTALL package. It converts a Logo object file into an executable Logo file. New primitives are installed in three steps; MAKEHOLE, deposit code and LINKALL. The procedure MAKEHOLE lowers the top of nodespace to make room for the machine code. It can also be used to make space for integer arrays. After the code is put into this space, LINKALL adds the labels to the contents list as primitives.

Assembly Logo

Object files are made by the Logo Assembler. This two-pass assembler is written in Logo by Peter Cann and Mark Jeffery. It accepts labels and has two pseudo-ops, DFB and EQU. The equates for system routines to pop arguments and the returns to Logo are predefined. A relocatable object module is created during the first pass. The STARTADDR is calculated to end the code at 37133, the top of nodespace. The Logo Assembler compiles about one instruction a second. Unlike BIG MAC there is time to read the code as it is assembled.

The Logo assembler can compile about forty lines of code. Larger files can be divided into parts or assembled outside of Logo. The install program can handle up to 800 bytes of object code. More code can be installed by using MAKEHOLE and LINKALL separately.

The sample program SWEEPS and the documentation chapters "Making your own Primitive" and "A Logo 6502 Assembler" explains the installation of machine code. Programmers with assembly language experience should have no trouble. The simple test program I wrote worked the first time.

Exploring Nodespace

Two packages look at and work on nodespace. In Apple Logo, nodespace extends from 16384 to 37133 ($4000 to $910D). This space is divide into 4149 nodes of five bytes. The Logo system uses about 1300 of these nodes. Each node starts with a type byte, its two high bits are used for garbage collection. The next two bytes are called the CAR and the last two are called the CDR (say could-er). The data in CAR and CDR is stored in standard 6502 low-high format. The data can be pointers to other nodes, the start address of a primitives machine code, or values like fixed and floating point numbers and ASCII characters.

The ASM.HELP and INSIDE packages have routines that examine and change node types, the CAR, the CDR, to convert hex to decimal and back, and to find the symbol and function nodes. Some of the routines of INSIDE can find and change the number of arguments that a procedure uses.

The .SYSTEM command resets the contents list to free up nodespace. Examining the nodespace can give the user a greater understanding of how Logo uses lists and symbols. Changing nodes is required to patch in a new primitive however arbitrary changes can be hazardous to Logo's health.

Don't Logo Without It

The Apple Logo Toolkit is a milestone for this language. It has removed Apple Logo from its black box so that anyone can tinker with it. Logo has the potential of being the layman's artifical intelligence language, as many LISP programs can be translated into Logo. If you plan on buying Apple Logo be sure to ask for the Sample Programs and Toolkit disks. Apple Logo users will find many uses for these programs and the price is hard to beat.

INTERESTING OR UNUSUAL APPLICATION OF YOUR APPLE?

Call -A.P.P.L.E. wants to bring its readers the most interesting and unusual applications of Apple computers. If you think the way you use your Apple would be interesting to the rest of the club, please write and tell us about it. It could lead to a story published in Call -A.P.P.L.E. To let us know; A.P.P.L.E., Applications, 21246 68th Ave. S., Kent, WA. 98032.

Poor Man's Integrated Software Package

Thomas E. Militello

OVER the past few months, a lot has been written in the Apple literature regarding "Integrated Software Packages." This term has come to mean many different things, depending on the author's point of view and particular interest. Like many other Apple owners, I have wondered if such a package is really worth its cost. In addition, the idea of discarding the word processor, data base manager and spreadsheet program that I currently use and with which I am very happy and then to start all over learning new commands for a whole new series of applications just seemed too big a step.

During this same period, I have had two projects which required the need to move large amounts of data from a data base to a spreadsheet and then to a word processor (just the kind of project for which an "Integrated Package" is intended). For the first project, I printed out a hard copy of the data base, and after setting up the spreadsheet template and developing the formulas, I re-entered all the data into the spreadsheet template and the spreadsheet provided me with the numerical results I needed.

Next, I fired up the word-processor and once again began the job of re-entering all the data a third time. The final product was exactly what I wanted, but after entering all those records three times, I felt I had them committed to memory (mine, not my Apple's).

When a second, similar project came up, the thought of all that repetitive keyboard work was more than I needed. Enter DIF files and the "Poor Man's Integrated Software Package" (PMISP).

What's the DIF?

Do not let the thought of DIF files frighten you away. If you own a reasonably good word processor, DBMS, or spreadsheet, then you may have noticed the section on DIF and immediately assumed it was something only the hackers could understand and use. *Not true*! We are about to take a step-by-step trip through your programs and into the world of "Integrated Software".

I do not claim to be an expert in the use of DIF files, and there may be better ways to do what I am about to describe. If there are, hopefully the experts will respond and we will all be the richer. I will describe the process I have discovered, and we can all go from there. I will assume that you are reasonably familiar with the operation of the DBMS, spreadsheet and word processor that you own, but that you have avoided any contact with the DIF file section of each of these programs.

A warning: Do everything described in this article on *copies* of your software, especially copies of your data disks. While nothing we are going to do is particularly difficult or dangerous, whenever you are learning a new technique, mistakes can happen. Please heed this advice!

The Task at Hand

To begin, my project involved a large amount of data already in a data base which required spreadsheet manipulation and then output in a document developed on a word processor. This seemed like a fairly typical project and the kind of thing integrated packages are supposed to do best.

The data base manager you use must have the ability to convert its own files into DIF files for this whole thing to work. I happen to use *The Data Reporter* from Synergistic Software. TDR is by no means a perfect piece of software, but it has done very well for me over the past three years and it would take something as yet unknown for me to change. Version 3.0 has just come out, and one of its new features is the ability to convert its own files into DIF format, and to do it with the press of one key.

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Step #1

Use whatever method your data base manager has to convert a COPY of a data file into a DIF file.

When you are trying this project for the first time, you will probably be using a small file. This is a good idea, but when you start working with real data files, be sure that the data base file that you are converting to DIF is not so large that the DIF file will be too big to load into your spreadsheet. Experience will teach you how big is too big for your particular system and set of programs. My spreadsheet will accept a DIF file that contains fewer than 253 data base records. If you are developing a data base file that you will want to put through this process, and the file will have more records than your spreadsheet will accept, it would be best to split the data base into two or more files. Again, if you are working with copies of your files, all that might be lost is some time if things go wrong.

A good idea is to add .DIF to the name of your DIF files. This is not necessary, and DIF files work just fine without this suffix, but it does help to know which files are DIF files when CATALOGing a disk.

The reason most of us *novices* avoided DIF when we first came upon it was that we had no idea what we would do with a DIF file if we ever had one. You will now put your new DIF file to use.

Now that you have a DIF file on a data disk, it is time to move into the second module of our PMISP. Boot your spreadsheet program. The spreadsheet I use is *THE Spreadsheet* from A.P.P.L.E., and most other spreadsheet programs also have the ability to create and use DIF files.

Each of these programs requires a special indicator to tell the program that a DIF file is being accessed. Visicalc requires that you insert '#' into the save or load command. This is discussed on Pages 3-66 and 3-67 of the Visicalc manual I have. If you use *THE Spreadsheet*, all that is necessary is that from the File Subsystem Menu you make Option #C (Use DIF Format) a "YES." After that, the program will expect any file that is loaded to be a DIF file and will save any file that is saved as a DIF file until Option #C is changed to "NO."

Step #2

Using the appropriate method for your spreadsheet, load the DIF file that you created in your data base management program into a blank spreadsheet screen.

If you use *THE Spreadsheet*, you are accustomed to seeing a file loaded from the bottom left to the top right. When a DIF file is loaded, it is loaded from the top right to the bottom left.

Once the DIF file has been loaded, you should see the data from the data base on the spreadsheet screen. At this point, you will have to build your spreadsheet template around this data. For example, you may need to change column widths or insert columns to separate data fields. You will probably want to insert rows as you design your template. You will need to insert titles and other dressings, and of course, you will have to insert the formulas that will operate on the data. However, the data from your data base is available for use without re-typing.

For a moderately large file, the whole process—including boot-up of *The Data Reporter*, converting a data file to a DIF file, loading the DIF file into *THE Spreadsheet* and seeing the data on the spreadsheet screen—usually takes no more than ten minutes. Typing in that amount of data might take five hours or more.

Now you must save your new spreadsheet worksheet. Save the worksheet to the data disk as a regular spreadsheet. If you are using *THE Spreadsheet*, this means changing Option #C in the File Subsystem back to "NO." Be sure to give it a suffix (something like maybe .SS) to remind you what kind of file it is. This is *not* a DIF file.

You will find that as long as each of your records contains fewer than 63 fields (the usual number of columns in most spreadsheets), your spreadsheet will probably be able to accept it. However, when we get to the next step where we move the data from the spreadsheet to the word processor and then to the printer, there will be a limit imposed by both the word processor and the printer on how many characters (bytes) can be included in each record. For example, *PIE Writer* will only accept files in which each record is less than 128 characters and the Epson MX-80 can only print a maxi-

mum of 132 characters (using Compressed mode) across a page. If your data base records are longer than the maximum of your word processor or printer, all is still not lost. All that is needed is to break your spreadsheet vertically into two separate templates and save each to disk. If you find it necessary to do this, just repeat the instructions in the next paragraph for each of the template segments. It is a bit more work, but it still beats re-entering all the data!

Next, go to the Print Module of your spreadsheet and print the worksheet to disk. In *THE Spreadsheet*, this is called "Print Softcopy." It is this "softcopy" or "print-to-disk" copy that we will use in the word processor. Again, be sure to give this "softcopy" a distinctive name or suffix.

This is the key step to the whole process. It is this "softcopy" that makes the data from the DBMS usable in your word processor. Even if you do not have a need for the spreadsheet to do numerical manipulation on your data, and merely want to get the records from a data base into your word processor, you still must go through the steps of loading the DIF file from the DBMS into the spreadsheet and then printing the spreadsheet to disk. However, it is the ability to have the spreadsheet perform numerical manipulation on the data base records before transferring the records to the word processor that makes this an "Integrated Software Package."

When you have a "softcopy" of your file on your data disk, it is time to move into the third module of our "PMISP," your word processor. The "softcopy" will be on the disk in the form of a Text file (Relax! You can handle this.).

Exit your spreadsheet program, and boot your word processor. It is necessary that your word processor be able to load standard Apple DOS text files. The word processor that I use is *PIE Writer* (Version 2.2) by Hayden Software. This is, by the way, the very best word processor for the Apple. No further discussion – the case is closed!

Step #3
Load your "softcopy" textfile into your word processor.

With PIE Writer this is done with the command +filename, where filename is the name of your "softcopy" textfile.

That's all there is to it. The data from your spreadsheet is now on your word processor screen. If your word processor has the ability to append one document into another, you can also "append" your "softcopy" into a document already in the word processor. If not, just build your document around the "softcopy". Either way, when done, save your document to your data disk (don't forget to add a distinctive suffix) and then print it on your printer.

There you have it! Your data has gone through three different processes, and you entered it only once! After you have done this once, the process will be much clearer and you will find you will want to manipulate your data in a multitude of new ways.

The DIF file that you created with your DBMS cannot be loaded directly into the word processor. It must first go through the "print-to-disk" process in the spreadsheet module. In fact, any spreadsheet data can be "printed-to-disk" and then used in your word processor. It does not necessarily have to be data that came from a DBMS. *The Data Reporter* also allows you to take raw spreadsheet data that has been saved to a DIF file and convert that file into a data file for use in a Data Reporter data base.

For a $6.00 fee, a list of programs which use DIF files can be obtained from DIF Clearinghouse, P.O. Box 638, Newton Lower Falls, MA, 02162. This might be helpful if you are not sure if your "modules" use DIF files or if you are thinking of purchasing a "module".

Well, good luck! I hope this saves you some money and maybe a lot of key presses.

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THE Spreadsheet Sheet

Data Analysis #8

Jeffrey M. Jacques, Ph.D.

LAST time we continued our discussion of the uses of chi square and the procedures which may be used to generalize, within certain probability limits, our sample statistics to the population of interest. We noted the importance of examining observed frequency differences of the random sample in light of what would be expected, all other things being equal.

This time we will take the next step and examine the relationships among the variables of our random sample. We have noted already that summary measures which report proportionate reduction in error—the degree to which we can reduce the errors in predicting the variable of interest when we know the joint distribution of the variable of interest and the explanatory variable(s)—are important and useful. These descriptive statistics, however, did not reveal if the patterns observed in the random sample were sufficiently reliable for us to infer that these same patterns existed in the population. This time we will answer the question: Are the relationships noted in the random sample statistically significant? Perhaps the best place to start is with the regression equation.

The Regression Equation, R^2 and the F-Ratio

While the regression equation is an important predictive tool, it is useful only when there is a substantial association between the variable of interest and the explanatory variable. We have noted two related measures which summarize the degree of linear association between the variables—the standard error of the estimate and R^2. Both of these measures are estimates of the goodness of fit to the true (perfect linear) regression line. Where R^2 is equal to zero, no linear association exists; where R^2 approaches 1, a linear relationship is noted and prediction is useful, reliable and accurate.

In most research projects, linear equations typically have an R^2 value somewhere between these two extremes of zero and one. You are, therefore, left with the question, when may I assume that the relationship observed in the random sample is a reliable indication of a linear relationship between the variables for the population? We know how to handle such questions from last time—i.e., just state the null and alternate hypotheses, set the significance level, determine the appropriate test statistic, and compare the computed and critical values to conclude probability level of significance.

Okay, we may know the form, but what are the specifics? Working with our random sample of faculty, let's examine whether or not a reliable linear relationship exists between the variables of income and rank. The hypotheses are:

H_0: There is no linear association between the variables of income and rank ($B = P = O$)

H_1: There is a significant positive association between the variables of income and rank ($B > O; P > O$)

You have probably noted several slight differences between this hypotheses set and the one used last time. First, both the current set of hypotheses include an expression B, which is the parameter of the estimate of the slope b, and P (or *rho*), which is the parameter of the correlation coefficient.

Secondly, we have modified the notion of no difference. That is, we shall use the idea of no difference but change it to read no association. If there is no linear association, the population parameters of slope (B) must be zero and the regression coefficient (P) must be zero, too. (Note that this test is only a test of linear association. A look at another procedure using attribute mean values will be discussed later. Now, let's return to the hypotheses.) The null hypothesis, then, is still phrased within the idea of no difference — when this difference is measured from zero ($B=0$), and the null hypothesis states no linear association between income and rank.

Thirdly, the alternate hypothesis is a little different than last time. Here we note not only that there is an association between the variables, but also the direction of the association. On the basis of what we know about our study, we can predict that the higher the rank, the higher the salary. Because we can state the direction of the hypothesis, the magnitude of the association needed for rejection of the null hypothesis is cut in half.

How do we decide which hypothesis is most likely to be true? Simply compare the ratio of explained and unexplained estimates of the variance and use the F-distribution. Say what? Okay, one at a time.

We have already mastered the idea of variation when we examined the statistics of variance and standard deviation. We noted that the numerator included the idea of sum of squares—the amount of variation from the mean, squared, then summed across all observations. The total sum of squares is simply the total amount of variation in the variable of interest or:

$$SUMy^2 = \sum_{i=1}^{n} (Yi - MeanY)^2$$

We noted earlier that R^2 states the amount of variation for which the linear model accounts—e.g., explained by the linear equation. Therefore, the sum of squares explained is:

$$SSexplained = R^2 * SUMy^2$$

and the amount still unexplained must be:

$$SSunexplained = (1-R^2) * SUMy^2$$

We can estimate the amount of explained and unexplained variation in the population by computing the degrees of freedom for each source of variation. The degrees of freedom associated with the total sum of squares is, of course, N – 1. The computation of the sum of squares about the regression line (i.e., unexplained variation) may be found by N – 2 (since we used two estimates, i.e., the intercept and slope, in the equation). With only one explanatory variable in the equation, the number of degrees of freedom for explained variation is 1.

By dividing the sum of squares by its appropriate degrees of freedom and by taking the ratio of these estimates of the variation, we can compute the F–value:

$$F\text{-value} = \frac{\text{Estimated Var(Expl)}}{\text{Estimated Var(Unexpl)}} = \frac{\frac{R^2\ SUMy^2}{1}}{\frac{1 - R^2) * SUMy^2}{N - 2}}$$

or:

$$F_{(1,N-2)} = \frac{R^2 (N - 2)}{(1 - R^2)}$$

Ideally, if your alternate hypothesis is correct, the estimated explained variation will be substantially larger than the estimated unexplained variation. In this case, substituting for the variables of income on rank yields this result:

$$F_{(1,18)} = \frac{.62713\ (20 - 2)}{(1 - .62713)} = \frac{11.28834}{.37287} = 30.274$$

(Some texts rather report a t–test value. I think this F–value makes more sense, especially when you can use it directly for a greater variety of tests and circumstances. More on this later. If you feel you must report the t–value, simply take the square root of the computed F–value and you will have a t–value with N–2 degrees of freedom.)

The F–distribution, which we shall use to compare our computed F–value with a critical value, has a known probability distribution and is defined as the ratio of two independently distributed chi squares, each divided by its degrees of freedom. The F–distribution function, or F–ratio, can be approximated using the following formula:

$$sig. = .5\ I(1 + z * (a_1 + z * (a_2 + z * (a_3 + z * a_4))))^4 + e(y)$$

where:

$a_1 = 0.196854$
$a_2 = 0.115194$
$a_3 = 0.000344$
$a_4 = 0.019527$

$$z = (F^{1/3} (1 - \frac{2}{9d_2}) - (1 - \frac{2}{9d_1})) * (\frac{2}{9d_1} + F^{2/3} * \frac{2\ 1/2}{9d_2})$$

d_1 = degrees of freedom in the numerator (generally from Explained variation)
d_2 = degrees of freedom in the denominator (generally from Unexplained variation)

$$e(y) = < 2.5 * 10^{-4}$$

Once we understand this equation, all that remains is to modify our bivariate regression worksheet to include the F–test.

Modifying the Worksheet for the F–Test

In the fifth episode we developed a worksheet which computed the bivariate correlations and regression equations for the faculty income study. In this article we shall modify this worksheet. So, take a minute and load it. I'll wait...

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TABLE 8.1

WORKSHEET MODIFICATIONS FOR TEST OF STATISTICAL SIGNIFICANCE FOR BIVARIATE CORRELATIONS

	K	L	M	N	O	P	Q	R	S
37	slope =	3830.2				A.N.O.V.A.	Table	B=0	
38	interc=	7831.5							
39	r	= .79194			Source	Sum Sqr	df	Est.Var	F-value
40	R^2	.62718							
41	Res.Vr=		1.05E7		Explained	+I31$L40	1	+P41/Q41	+R41/R42
42	St.Err=		3246.2		Unexpl.	+I31$(1-L40)	+L28-2	+P42/Q42	
43					Total	+I31	+Q41+Q42		
44									
								R	S
45								.196854	@IF(S41<1,Q42,Q41)
46								.115194	@IF(S41<1,Q41,Q42)
47								.000344	@IF(S41<1,1/S41,S41)
48								.019527	2/9/S45
49									2/9/S46
50									(@ABS(((1-S49)$(S47^(1/3)))-1+S48))/
51									@SQRT(((S49$(S47^(2/3)))+S48))
									@IF(S46<4,S50$(1+((.08$(S50^4))/(S46^3))),S50)
52									.5/((S51$R48+R47$S51+R46$S51+R45$S51+1)^4)
53									@ROUND(S52,4)
54								Signif =	@IF(S41<1,(1-S53)/2,S53/2)

NOTE: Columns do not align perfectly so that you may more see more easily the full equations. Also, note that several blank lines were inserted for ease in reading the table.

In columns O through S, rows 39 through 55, we shall compute the level of statistical significance for any pair of interval level variables. A summary analysis of variance (ANOVA) table, which is used to compute the F-value,is listed in rows 39 to 43. Column R lists the constants for the equation, and column S computes the necessary values. Take a few minutes and study Table 8.1.

Once all the equations are entered, assuming that you are using the correct worksheet, a simple press of the ! key will invoke *THE Spreadsheet* to compute the necessary values. Check your results with those listed in Table 8.2.

Assuming everything went all right, modify your summary table (rows 44 through 55) and add in column M the level of statistical significance. Simply transfer the value in cell S54 to the appropriate row (e.g., for the variables of income and rank, row 48, column M). Then /Reproduce the next variable pair in the top part of the table, compute all the appropriate values and complete the modified correlation summary table. Not too tough, all things considered.

From these sample results, we can conclude that the relationship between salary and the variables of rank and academic degree were statistically significant—as one would reasonably expect. Sex was less important and the test confirms that the number of years employed had little to do with salary. Furthermore, academic degree was a good predictor of rank, but neither sex nor the number of years employed were of much use, at least for this population.

Remember the Better Mousetrap

If you recall from last time, we constructed a general template when working with contingency table analyses. This is your chance to complete this table by including an F-test for R^2 and for Eta^2. That's right, the

TABLE 8.2

TEST OF STATISTICAL SIGNIFICANCE FOR BIVARIATE CORRELATIONS

	G	H	I	J	K	L	M	N	O	P	Q	R	S
37					slope = 3830.2					A.N.O.V.A. Table B=0			
38					interc= 7831.5								
39					r = .79194					Source	Sum Sqr	df	Est.Var	F-value
40					R^2 .62718									
41					Res.Vr= 1.05E7					Explained	206334	1	206334.1	30.280
42					St.Err= 3246.2					Unexpl.	122655	18	6814.162	
43										Total	328989	19		
44			Bivariate Correlation Summary											
45													.196854	1
46	Dep.Vr	Ind.Vr	Intcpt	Slope	R^2	St. Err	Sig.						.115194	18
47													.000344	30.280
48	Income	Rank	7831.5	3830.2	.62713	3246.2	.0001						.019527	.22222
49	Income	Degree	5878.3	4698.3	.5098	3722.2	.0003							.01235
50	Income	Sex	14821	3257.3	.104	5031.6	.08							3.9331
51	Income	Yrsemp	16105	40.5	.005	5303.5	.38							3.9331
52	Rank	Degree	-.38298	1.17	.73979	.5607	.0001							.00011
53	Rank	Yrsemp	1.93	.038	.0978	1.044	.088							.0001
54	Rank	Sex	2.1	.3	.021	1.088	.276						One-tail Signif=	.00005
55														

NOTE: Data in ANOVA table are from the variables of Income on Rank.

same general procedure of the F–test can be used for both measures of association. The only major differences are in the computations for the degrees of freedom, the F–value, and the significance level.

First, while the number of degrees of freedom for R^2 is computed on the basis of the linear model, the same is not true when working with Eta². In this case the number of degrees of freedom for the numerator are computed on the basis of the number of different attributes of the independent variable—e.g., the number of different means. In this general template, we have computed this value in cell H31. The numerator, sometimes called "df for explained variation" or between sum of squares, may be calculated by subtracting 1 from cell H31. This is fairly logical since Eta² tells us the degree of improvement of prediction from knowledge of category mean values. In computing the number of degrees of freedom for the denominator, sometimes called the "df for unexplained variation," simply subtract the number of attributes of the explanatory variable (H31) from the total number of cases (Cell 55).

Just as the F–value for R^2 is computed by taking the ratio of explained and unexplained estimates of the variation, the F–value for Eta² may be found by taking these same estimates. When we computed Eta² we found the values for the explained sum of squares—ESS (cell G91), and the total sum of squares—TSS(cell G92). The unexplained sum of squares, then, is equal to G92 – G91. The estimates of the variation are computed by dividing the number of degrees of freedom into these sum of squares. The F–value is the ratio of these estimates. See Table 8.3.

Once these three values are computed, the procedures for determining the F–ratio level of significance for R^2 and Eta² are parallel through all the steps except for the last step. Why? When working with R^2 we have predicted the direction of the relationship. When working with Eta² we have hypothesized only that the mean attribute values are different from each other. (More precisely, the two most extreme mean values are different from each other.) The significance level for R^2 is therefore computed by taking sig./2 . For Eta², the computed value of significance is simply reported as computed. See cells J52 and K52.

All that remains is to report these values in the top part of the template. Just enter "sig. = +" in cells J20 and J22. Then the level of significance for R^2 may be reported in cell K20 (enter +J52), and the level of significance for Eta² may be reported in cell K22 (enter +K52). That's all folks.

Conclusion

With this article, we have explored the F–test and demonstrated its uses for testing statistical significance of the linear model and Eta². We have noted how to modify a master template for contingency table analysis to include these values. Next time we will construct a new template which will enable us to explore more directly another use of the F–test and its friends—i.e. one–way Analysis of Variance and its ancillary statistics such as maximum/minimum variance ratio test, a priori contrasts, and a posteriori comparisons. It will be fun. See you then.

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TABLE 8.3

CONTINGENCY TABLE TEMPLATE MODIFICATIONS FOR TEST OF STATISTICAL SIGNIFICANCE FOR PEARSONIAN R AND ETA^2

	I	J	K
34		F-test	
35			
36	Sum. val.	R^2	Eta^2
37			
38	df(num)=	1	+H31 - 1
39	df(den)=	+C55 - 2	+C55 - H31
40	F-value=	+684*(C55-2)/(1-684)	+691/K38/((692-691)/K39)
41			
42	a-values	F-ratio	F-ratio
43	.196854	@IF(J40<1,J39,J38)	@IF(K40<1,K39,K38)
44	.115194	@IF(J40<1,J38,J39)	@IF(K40<1,K38,K39)
45	.000344	@IF(J40<1,1/J40,J40)	@IF(K40<1,1/K40,K40)
46	.019527	2/9/J43	2/9/K43
47		2/9/J44	2/9/K44
48		(@ABS(((1-J47)*(J45^(1/3)))-1+J46))/ @SQRT(((J47*(J45^(2/3)))+J46))	(@ABS(((1-K47)*(K45^(1/3)))-1+K46))/ @SQRT(((K47*(K45^(2/3)))+K46))
49		@IF(J44<4,J48*(1+((.08*(J48)^4))/ (J44^3))),J48)	@IF(K44<4,K48*(1+((.08*(K48)^4))/ (K44^3))),K48)
50		.5/((J49*I46+I45*J49+I44*J49+I43*J49+1)^4)	.5/((K49*I46+I45*K49+I44*K49+I43*K49+1)^4)
51		@ROUND(J50,4)	@ROUND(K50,4)
52	Signif=	@IF(J40<1,(1-J51)/2,J51/2)	@IF(K40<1,(1-K51),K51)

NOTE: Columns do not align perfectly so that you may see more easily the full equations. Also, note that several blank lines were inserted for ease in reading the table.

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Don Elman

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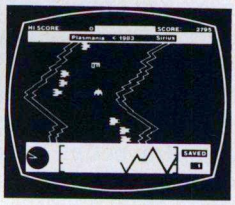

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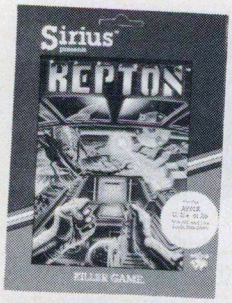

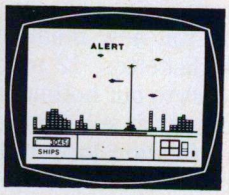

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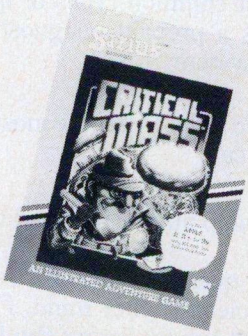

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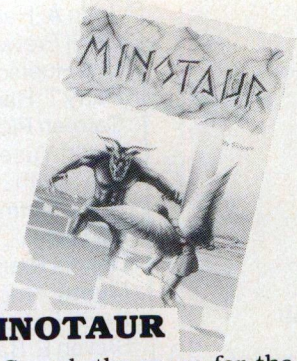

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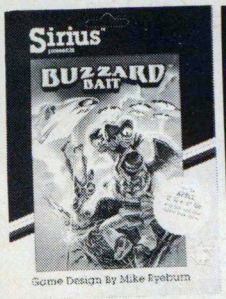

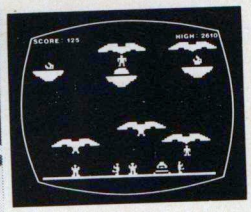

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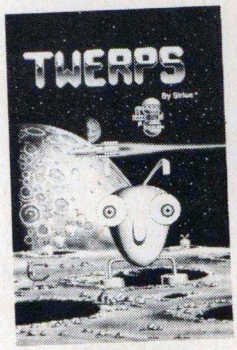

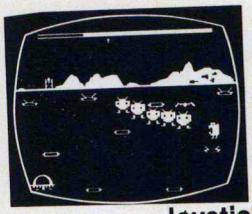

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The Graphics Toolkit Part 3

Randi J. Rost

WELCOME to the third installment of The Graphics Toolkit series. In the first two parts we developed some simple routines to clear the screen, plot a point and so on, and laid the groundwork for more difficult routines to come. This time we'll look at line-drawing algorithms and present a disassembled, commented version of the line-drawing routine used within Applesoft.

Bug Report

Before we do that, however, we already have a bug to report. In Part 1 of The Graphics Toolkit, a program was presented that would POKE in the values needed for our look-up table (the YTABLE). Donald Cohen of New York City noticed that the length of the YTABLE was $4BB and not $460 as shown in Listing 1 of that article. Therefore, line 900 should read:

```
900   PRINT CHR$(4); "BSAVE
      YTABLE, A$2000,
      L$4BB"
```

This error will not affect the demo programs developed so far, but will wreak havoc in the future since part of the YTABLE is not saved. Make the change and then re-run the program to generate a new YTABLE. Thanks for double-checking my arithmetic, Donald!

Line-Drawing

One of the earliest graphics problems involved computing which pixels to turn on to give the most reasonable approximation of a line between two points. Three of the criteria for a good line-drawing algorithm are:

1. Lines should appear straight.
2. Lines should terminate accurately.
3. Lines should be drawn rapidly.

There are some other considerations as well, but these three are the most pertinent to the two algorithms we'll look at here.

The Simple DDA

Your first attempt at developing a line-drawing algorithm might lead you to come up with one similar to the simple DDA, or digital differential analyzer. The algorithm stems from the fact that differential equations of the lines themselves are used to generate the line. For straight lines we have a very simple equation:

$$\frac{dy}{dx} = \text{delta y / delta x} = (y2-y1)/(x2-x1) = \text{slope of line}$$

The algorithm then works on the principal that we increment the current plotting position each iteration by a value proportional to the slope of the line. In the case of the simple DDA, the number of points to be plotted is assumed to be the larger of abs(dx)+1 and abs(dy)+1 where (x1,y1) and (x2,y2) are the endpoints of the line to be drawn and dx=x2-x1 and dy=y2-y1.

Values for Xinc and Yinc are then computed such that Yinc/Xinc = slope, and at least one of Xinc and Yinc is unit magnitude (1 or -1). Since we are also dealing with a grid of points addressed by integers, we'll have to round off floating point numbers to integers before plotting points.

The simple DDA algorithm first calculates the number of points to be plotted as well as values for Xinc and Yinc and accomplishes rounding by adding a value of 0.5 to the starting x and y positions. The first point is obtained by taking the integer value of the starting x and y positions. After the first point is plotted, Xinc and Yinc are added to the current position, the integer value is taken, the point is plotted and the process repeats until the previously calculated number of points has been plotted. Listing 1 shows an implementation of the simple DDA algorithm in Applesoft BASIC.

Bresenham's Algorithm

As everyone who's tinkered at the

Listing 1

```
100  TEXT : HOME : VTAB 10
110  PRINT "INPUT X1,Y1";: INPUT X1,Y1
120  PRINT "INPUT X2,Y2";: INPUT X2,Y2
130 DX = X2 - X1:DY = Y2 - Y1
140 AX =  ABS (DX):AY =  ABS (DY)
150 COUNT = AX
160  IF AY <  = AX THEN 180
170 COUNT = AY
180 EX = DX / COUNT:EY = DY / COUNT
190  HGR : HCOLOR= 3
200  FOR I = 1 TO COUNT
210  HPLOT  INT (X1 + 0.5), INT (Y1 + 0.5)
220 X1 = X1 + EX
230 Y1 = Y1 + EY
240  NEXT I
```


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level of bits and bytes knows, integer arithmetic is much faster than floating point arithmetic on machines with no floating point hardware. In addition, adds and subtracts are significantly faster than multiplies and divides on machines with no multiply or divide instructions. Many microcomputers, including the Apple, are based on microprocessors that contain neither multiply and divide instructions nor floating point capability. J.E. Bresenham came up with an algorithm that runs significantly faster than the simple DDA algorithm on such machines since it requires only additions, subtractions, and multiplication by two (which can be performed with a rotate instruction).

Bresenham's algorithm is like the simple DDA in that each iteration changes one of the coordinates by 1 or -1. For each iteration, the other coordinate may or may not change, depending on the error term maintained by the algorithm. For cases where dx < dy, this error term is initialized to abs(dx)*2 -dy, and for dx > =dy it is initialized to abs(dy)*2 - dx. This forces the error term to be negative. Each time a point is plotted a value of dx*2 (for the first case) or dy*2 (for the second case) is added to the error term. When the error term becomes positive, it is time to increment the other coordinate as well. Listing 2 is an Applesoft implementation of Bresenham's algorithm.

Listing 2

```
100  TEXT : HOME : VTAB 10
110  PRINT "INPUT X1,Y1";: INPUT X1,Y1
120  PRINT "INPUT X2,Y2";: INPUT X2,Y2
130  HGR : HCOLOR= 3
140 DX = X2 - X1:XINC = 1
150  IF DX >  = 0 THEN 170
160 DX =  - DX:XINC =  - 1
170 DY = Y2 - Y1:YINC = 1
180  IF DY >  = 0 THEN 200
190 DY =  - DY:YINC =  - 1
200  IF DX < DY THEN 290
205  REM  ** CASE WHERE DX >= DY **
210 ERR = DY * 2 - DX
220  HPLOT X1,Y1
230 X1 = X1 + XINC: IF X1 = X2 THEN 370
240 ERR = ERR + DY * 2
250  IF ERR <  = 0 THEN 220
260 Y1 = Y1 + YINC
270 ERR = ERR - DX * 2
280  GOTO 220
285  REM  ** CASE WHERE DX < DY **
290 ERR = DX * 2 - DY
300  HPLOT X1,Y1
310 Y1 = Y1 + YINC: IF Y1 = Y2 THEN 370
320 ERR = ERR + DX * 2
330  IF ERR <  = 0 THEN 300
340 X1 = X1 + XINC
350 ERR = ERR - DY * 2
360  GOTO 300
370  END
```

Applesoft's Line-Drawing Routine

Listing 3 contains a disassembled version of Applesoft's line-drawing routine, with a few minor changes. I have utilized a YTABLE look-up to speed up the algorithm slightly. I did try writing my own line-drawing routine, but I found that the routine that Applesoft uses to draw lines takes such good advantage of the Apple's peculiar architecture that it was tough to improve upon it. If you're curious, the original routine can be found in memory starting at location $F53A.

Your mission for this month is to count the number of cute tricks that were used to make the routine more efficient. I will point out a few to give you the flavor of what can be done.

One of the most useful speed-up tricks is the use of in-line code. This line-drawing routine could be written using a call to HPLOT, but that would involve the execution of at least two more instructions—a JSR to call the subroutine and an RTS to return. Instead, the code for HPLOT can be duplicated within the HLINE routine wherever needed since it is so short, thus saving a few precious cycles each time a point is plotted.

Another trick that is used successfully in this routine is the manner by which screen address calculation is avoided unless absolutely necessary. Recall that information about seven pixels is stored in a single byte of the Apple's screen memory. If the next point to be plotted is one dot left or right of the point last plotted, there's a good chance that the pixel is contained in the same byte as the last one was and the position within the byte is all that needs to be changed.

Look for these and other speed-up techniques used in the line-drawing routine used by Applesoft. It is basically the Bresenham algorithm with some Apple-specific quirks. Follow along with the Applesoft listing of the algorithm in Listing 2, and note the sections of the assembly language listing that correspond to the Applesoft implementation.

Why do we need a line-drawing routine in our toolkit anyway? Why can't we just use the one built into the Apple? Well, for one thing, there are still a few people around (like me!) who have the antique Apple II's with Integer Basic in ROM instead of Applesoft. For another, we want our toolkit to contain all the tools we will be needing, and we want them to be consistent with all the other tools. And finally, we want to learn more about line-drawing algorithms so that we can implement them on other machines as well.

The Demo Program

Another short demo program is included as Listing 4. Before running the demo program, you must load the YTABLE and the other toolkit routines we have developed. Again, keep in mind that the demo program is essentially an "applications" program. Its only desire is to use the graphics subroutines we have developed so far. An application should be able to use the toolkit routines given only the starting addresses of the routines and the conventions for passing arguments. Applications programs don't need to know anything about the internal operation of the toolkit routines.

Next time we'll take a look at setting up a graphics "window" and do a few special effects. After that we'll begin talking about shape tables and routines needed to do arcade-quality animation on the Apple.

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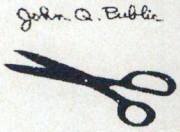

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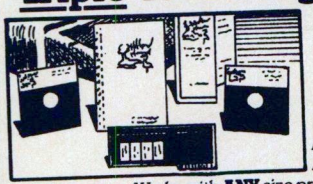

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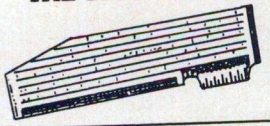

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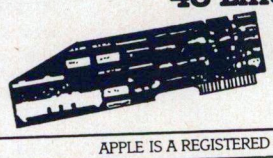

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Circle 48 on Reader Service Card

Listing 3

```
091A: BD 11 09
091D: A5 E2
091F: BD 13 09
0922: 8A
0923: AE 11 09
0926: 48
0927: 38
0928: E5 E0
092A: 48
092B: 8A
092C: E5 E1
092E: 8D 17 09
0931: B0 0B
0933: 68
0934: 49 FF
0936: 69 01
0938: 48
0939: A9 00
093B: ED 17 09
093E: 8D 15 09
0941: 8D 19 09
0944: 68
0945: 8D 14 09
0948: 8D 18 09
094B: 68
094C: 85 E0
094E: 86 E1
0950: 98
0951: 18
0952: E5 E2
0954: 90 04
0956: 49 FF
0958: 69 FE
095A: 8D 16 09
095D: 84 E2
095F: 6E 17 09
0962: 38
0963: ED 14 09
0966: AA
0967: A9 FF
0969: ED 15 09
096C: 85 1D
096E: A4 E5
0970: B0 05
0972: 0A
0973: 20 B4 09
0976: 38
0977: AD 18 09
097A: 6D 16 09
097D: 8D 18 09
0980: AD 19 09
0983: E9 00
0985: 8D 19 09
0988: B1 26
098A: 45 1C
098C: 25 30
098E: 51 26
0990: 91 26
0992: E8
0993: D0 04
0995: E6 1D
0997: F0 1A
0999: AD 17 09
099C: B0 D4
099E: 20 26 0A
09A1: 18
09A2: AD 18 09
09A5: 6D 14 09
09A8: 8D 18 09
09AB: AD 19 09
09AE: 6D 15 09
09B1: 50 D2
09B3: 60
09B4: 10 23
09B6: A5 30
09B8: 4A
09B9: B0 05
09BB: 49 C0
09BD: 85 30
09BF: 60
09C0: 88
09C1: 10 02
09C3: A0 27
09C5: A9 C0
09C7: 85 30
09C9: 84 E5
09CB: A5 1C
09CD: 0A
09CE: C9 C0
09D0: 10 06
```

```
10
11                ORG   $911
12     SHFTCHK    EQU   $1C
13     TEMPPTR    EQU   $26
14     POSBIT     EQU   $30
15     LOOPLIM    EQU   $1D
16     OLDXLO     EQU   $E0
17     OLDXHI     EQU   $E1
18     OLDY       EQU   $E2
19     BYTENUM    EQU   $E5
20     HGRPG      EQU   $E6
21     COLCTR     EQU   $EA
22     YTABL      EQU   $EC
23     YTABH      EQU   $EE
24     DTEMPX     DS    1
25     DTEMPY     DS    1
26     OLDY2      DS    1
27     ABSDXLO    DS    1
28     ABSDXHI    DS    1
29     ABSDY      DS    1
30     DXHI       DS    1
31     ERRLO      DS    1
32     ERRHI      DS    1
33     *
34     *  HLINE WILL DRAW A LINE IN THE CURRENT PLOTTING
35     *  COLOR FROM THE POINT LAST HPOSN'ED OR HPLOTTED
36     *  TO THE POINT PASSED IN THE REGISTERS AS FOLLOWS-
37     *  XHI IN A, XLO IN X, AND Y IN Y.
38     *
39     HLINE      STA   DTEMPX      ;TWIDDLE REGISTERS TO ALLOW
40                LDA   OLDY        ;OPTIMAL SPEED IN ALGORITHM
41                STA   OLDY2       ;SAVE OLDY AS A REFERENCE PT
42                TXA
43                LDX   DTEMPX
44                PHA               ;SAVE XLO ON STACK
45                SEC
46                SBC   OLDXLO      ;NEWXLO - OLDXLO
47                PHA               ;SAVE DXLO ON STACK
48                TXA
49                SBC   OLDXHI      ;NEWXHI - OLDXHI
50                STA   DXHI
51                BCS   DXNOTNEG
52                PLA               ;GET ABS(DX) IF
53                EOR   #$FF        ;DX < 0
54                ADC   #$01
55                PHA
56                LDA   #$00
57                SBC   DXHI
58     DXNOTNEG   STA   ABSDXHI
59                STA   ERRHI       ;SAVE ABS(DX) HI BYTE
60                PLA
61                STA   ABSDXLO
62                STA   ERRLO       ;SAVE ABS(DX) LO BYTE
63                PLA
64                STA   OLDXLO
65                STX   OLDXHI
66                TYA
67                CLC
68                SBC   OLDY        ;NEWY - OLDY
69                BCC   DYNOTNEG
70                EOR   #$FF        ;GET ABS(DY) IF DY < 0
71                ADC   #$FE
72     DYNOTNEG   STA   ABSDY
73                STY   OLDY
74                ROR   DXHI
75                SEC
76                SBC   ABSDXLO
77                TAX
78                LDA   #$FF
79                SBC   ABSDXHI     ;CALCULATE LOOPLIMIT
80                STA   LOOPLIM
81                LDY   BYTENUM
82                BCS   SKIPINCX
83     INCXLOOP   ASL
84                JSR   DECRX       ;GO INCREMENT (OR DEC) X POS.
85                SEC
86     SKIPINCX   LDA   ERRLO
87                ADC   ABSDY
88                STA   ERRLO
89                LDA   ERRHI
90                SBC   #$00
91     PLOTMORE   STA   ERRHI
92                LDA   (TEMPPTR),Y ;LOAD CURRENT CONTENTS
93                EOR   SHFTCHK     ;SCREEN BYTE, EOR IT WITH
94                AND   POSBIT      ;COLOR BYTE, AND IT WITH
95                EOR   (TEMPPTR),Y ;POSBIT, EOR WITH SCREEN
96                STA   (TEMPPTR),Y ;AGAIN AND PUT IT BACK.
97                INX
98                BNE   NOTDONE
99                INC   LOOPLIM
100               BEQ   HLDONE      ;WE'RE DONE WHEN LOOPLIM=0
101    NOTDONE    LDA   DXHI
102               BCS   INCXLOOP
103               JSR   INCRY       ;NOW GO INC (OR DEC) Y
104               CLC
105               LDA   ERRLO
106               ADC   ABSDXLO
107               STA   ERRLO
108               LDA   ERRHI
109               ADC   ABSDXHI
110               BVC   PLOTMORE    ;GO BACK FOR MORE PTS
111    HLDONE     RTS
112    DECRX      BPL   INCRX       ;IF INC VALUE > 0 GO INCREMENT
113               LDA   POSBIT      ;IF NOT, DECREMENT PIXEL
114               LSR               ;POSITION BYTE
115               BCS   DECBYTNO    ;IF SHIFT TOO FAR, DEC BYTENUM
116               EOR   #$C0        ;TURN BIT 7 ON, BIT 6 OFF
117    DECDONE1   STA   POSBIT      ;STORE RESULT BACK IN POSBIT
118               RTS
119    DECBYTNO   DEY               ;DECREMENT BYTE # IN ROW
120               BPL   NOWRAP
121               LDY   #$27        ;WRAP AROUND IF X<0
122    NOWRAP     LDA   #$C0        ;AND BITS 6 & 7 ARE ON
123    STOREPOS   STA   POSBIT      ;IN POSITION BYTE
124               STY   BYTENUM     ;AND IN BYTE # COUNTER
125               LDA   SHFTCHK
126               ASL               ;SHIFT COLOR MASKING BYTE
127               CMP   #$C0
                  BPL   DECDONE2
```

Listing 3 *(Continued)*

```
09D2: A5 1C
09D4: 49 7F
09D6: 85 1C
09D8: 60
09D9: A5 30
09DB: 0A
09DC: 49 80
09DE: 30 DD
09E0: A9 81
09E2: C8
09E3: C0 28
09E5: 90 E0
09E7: A0 00
09E9: B0 DC
09EB: 18
09EC: AD 15 09
09EF: 29 04
09F1: F0 26
09F3: A9 7F
09F5: 25 30
09F7: 31 26
09F9: D0 1A
09FB: E6 EA
09FD: A9 7F
09FF: 25 30
0A01: 10 12
0A03: 18
0A04: AD 15 09
0A07: 29 04
0A09: F0 0E
0A0B: B1 26
0A0D: 45 1C
0A0F: 25 30
0A11: D0 02
0A13: E6 EA
0A15: 51 26
0A17: 91 26
0A19: AD 15 09
0A1C: 6D 17 09
0A1F: 29 03
0A21: C9 02
0A23: 6A
0A24: B0 8E
0A26: 30 20
0A28: 8C 12 09
0A2B: CE 13 09
0A2E: AC 13 09
0A31: C0 FF
0A33: D0 05
0A35: A0 BF
0A37: 8C 13 09
0A3A: B1 EC
0A3C: 85 26
0A3E: B1 EE
0A40: 05 E6
0A42: 85 27
0A44: AC 12 09
0A47: 60
0A48: 8C 12 09
0A4B: EE 13 09
0A4E: AC 13 09
0A51: C0 C0
0A53: D0 05
0A55: A0 00
0A57: 8C 13 09
0A5A: B1 EC
0A5C: 85 26
0A5E: B1 EE
0A60: 05 E6
0A62: 85 27
0A64: AC 12 09
0A67: 60
```

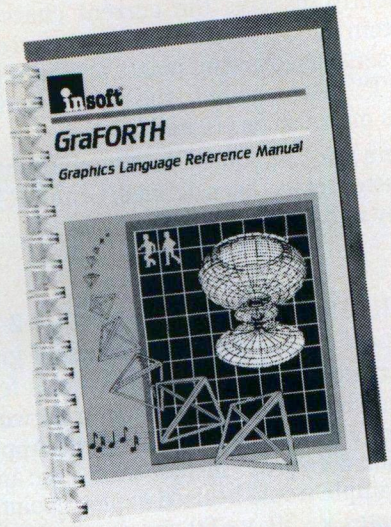
```
128             LDA     SHFTCHK
129             EOR     #$7F
130             STA     SHFTCHK
131 DECDONE2    RTS
132 INCRX       LDA     POSBIT
133             ASL
134             EOR     #$80
135             BMI     DECDONE1
136             LDA     #$81
137             INY
138             CPY     #$28
139             BCC     STOREPOS
140             LDY     #$00
141             BCS     STOREPOS
142             CLC
143             LDA     ABSDXHI
144             AND     #$04
145             BEQ     SKIPPLOT
146             LDA     #$7F
147             AND     POSBIT
148             AND     (TEMPPTR),Y
149             BNE     PLOTPT
150             INC     COLCTR
151             LDA     #$7F
152             AND     POSBIT
153             BPL     PLOTPT
154             CLC
155             LDA     ABSDXHI
156             AND     #$04
157             BEQ     SKIPPLOT
158             LDA     (TEMPPTR),Y
159             EOR     SHFTCHK
160             AND     POSBIT
161             BNE     PLOTPT
162             INC     COLCTR
163 PLOTPT      EOR     (TEMPPTR),Y
164             STA     (TEMPPTR),Y
165 SKIPPLOT    LDA     ABSDXHI
166             ADC     DXHI
167             AND     #$03
168             CMP     #$02
169             ROR
170             BCS     DECRX
171 INCRY       BMI     DECRY
172             STY     DTEMPY
173             DEC     OLDY2
174             LDY     OLDY2
175             CPY     #$FF
176             BNE     LT192
177             LDY     #191
178             STY     OLDY2
179 LT192       LDA     (YTABL),Y
180             STA     TEMPPTR
181             LDA     (YTABH),Y
182             ORA     HGRPG
183             STA     TEMPPTR+1
184             LDY     DTEMPY
185             RTS
186 DECRY       STY     DTEMPY
187             INC     OLDY2
188             LDY     OLDY2
189             CPY     #192
190             BNE     GTO
191             LDY     #0
192             STY     OLDY2
193 GTO         LDA     (YTABL),Y
194             STA     TEMPPTR
195             LDA     (YTABH),Y
196             ORA     HGRPG
197             STA     TEMPPTR+1
198             LDY     DTEMPY
199             RTS
```

```
;DO THE COLOR SHIFT IF NEC.

;SHIFT POSBIT LEFT TO
;INCREMENT X (LEAVE BIT 7 ON)

;SHIFTED OUT OF CURRENT BYTE
;SO INCREMENT BYTE #
;BUT NOT PASSED 40 (X=280)

;WRAPAROUND IF X>279

;SEE IF NEW POINT COLLIDES
;WITH ANOTHER ON THE SCREEN

;PLOT THE POINT

;GO BACK FOR MORE
;DECREMENT Y IF INDEX < 0
;SAVE BYTE POSITION
;DEC CURRENT Y VALUE
;LOAD IT INTO INDEX REG
;SEE IF WE'RE OFF TOP OF SCRN
;IF NOT, SKIP
;ELSE WRAPAROUND TO BOTTOM
;SAVE AS CURRENT Y
;GET Y BASE ADDRESS FROM TABLE

;GET CORRECT HGRPG

;RESTORE BYTENUM

;SAVE BYTENUM FOR LATER
;INCREMENT Y POSITION
;LOAD IT FOR INDEXING YTABLE
;ARE WE OFF BOTTOM EDGE?

;IF SO, WRAPAROUND
;SAVE AS CURRENT Y LOC.
;LOAD Y BASE ADDRESS FROM TABLE

;GET CORRECT HGRPG

;RESTORE BYTENUM
```

```
--End assembly--

343 bytes

Errors: 0

Symbol table - alphabetical order:

  ABSDXHI =$0915      ABSDXLO =$0914      ABSDY   =$0916      BYTENUM =$E5
  COLCTR  =$EA        DECBYTNO=$09C0      DECDONE1=$09BD      DECDONE2=$09D8
  DECRX   =$09B4      DECRY   =$0A48      DTEMPX  =$0911      DTEMPY  =$0912
  DXHI    =$0917      DXNOTNEG=$093E      DYNOTNEG=$095A      ERRHI   =$0919
  ERRLO   =$0918      GTO     =$0A5A      HGRPG   =$E6        HLDONE  =$09B3
? HLINE   =$091A      INCRX   =$09D9      INCRY   =$0A26      INCXLOOP=$0972
  LOOPLIM =$1D        LT192   =$0A3A      NOTDONE =$0999      NOWRAP  =$09C5
  OLDXHI  =$E1        OLDXLO  =$E0        OLDY    =$E2        OLDY2   =$0913
  PLOTMORE=$0985      PLOTPT  =$0A15      POSBIT  =$30        SHFTCHK =$1C
  SKIPINCX=$0977      SKIPPLOT=$0A19      STOREPOS=$09C7      TEMPPTR =$26
  YTABH   =$EE        YTABL   =$EC

Symbol table - numerical order:

  SHFTCHK =$1C        LOOPLIM =$1D        TEMPPTR =$26        POSBIT  =$30
  OLDXLO  =$E0        OLDXHI  =$E1        OLDY    =$E2        BYTENUM =$E5
  HGRPG   =$E6        COLCTR  =$EA        YTABL   =$EC        YTABH   =$EE
  DTEMPX  =$0911      DTEMPY  =$0912      OLDY2   =$0913      ABSDXLO =$0914
  ABSDXHI =$0915      ABSDY   =$0916      DXHI    =$0917      ERRLO   =$0918
  ERRHI   =$0919    ? HLINE   =$091A      DXNOTNEG=$093E      DYNOTNEG=$095A
  INCXLOOP=$0972      SKIPINCX=$0977      PLOTMORE=$0985      NOTDONE =$0999
  HLDONE  =$09B3      DECRX   =$09B4      DECDONE1=$09BD      DECBYTNO=$09C0
  NOWRAP  =$09C5      STOREPOS=$09C7      DECDONE2=$09D8      INCRX   =$09D9
  PLOTPT  =$0A15      SKIPPLOT=$0A19      INCRY   =$0A26      LT192   =$0A3A
  DECRY   =$0A48      GTO     =$0A5A
```

Listing 4

```
:ASM
                        1     *
                        2     * TITLE: DEMO PROGRAM 3
                        3     * FUNCTION: TEST HCOLOR, HPOSN AND HLINE ROUTINES
                        4     * AUTHOR:    RANDI J. ROST
                        5     * DATE:      10-JUN-84
                        6     *
                        7     *
                        8               ORG   $6000
                        9     INIT      EQU   $803
                       10     HGR       EQU   $865
                       11     HCOLOR    EQU   $8BD
                       12     HPOSN     EQU   $8D3
                       13     HLINE     EQU   $91A
6000: A9 1B             14     DEMO3     LDA   #$1B       ;LOAD A WITH YTABLE ADR HI
6002: A2 00             15               LDX   #$00       ;LOAD X WITH YTABLE ADR LO
6004: 20 03 08          16               JSR   INIT       ;SET UP LOOKUP TABLE PTRS
6007: 20 65 08          17               JSR   HGR        ;INIT HI-RES GRAPHICS ON PAGE 1
600A: A9 BF             18               LDA   #191       ;INIT Y TO 191
600C: 8D 31 60          19               STA   TEMPY
600F: AD 31 60          20     LOOP      LDA   TEMPY      ;LOAD CURRENT Y VALUE
6012: 29 07             21               AND   #7         ;MASK OFF ALL BUT BOTTOM 3 BITS
6014: 20 BD 08          22               JSR   HCOLOR     ;USE THIS AS PLOT COLOR
6017: A9 00             23               LDA   #0         ;XHI = 0
6019: A2 00             24               LDX   #0         ;XLO = 0
601B: AC 31 60          25               LDY   TEMPY      ;LOAD CURRENT Y VALUE
601E: 20 D3 08          26               JSR   HPOSN      ;POSITION ENDPOINT 1
6021: A9 01             27               LDA   #1         ;XHI = 1
6023: A2 17             28               LDX   #23        ;XLO = 23 (XVALUE = 279)
6025: AC 31 60          29               LDY   TEMPY      ;LOAD CURRENT Y VALUE
6028: 20 1A 09          30               JSR   HLINE      ;DRAW THE HORIZONTAL LINE
602B: CE 31 60          31               DEC   TEMPY      ;DECREMENT CURRENT Y VALUE
602E: D0 DF             32               BNE   LOOP       ;DRAW MORE IF Y <> 0
6030: 60                33               RTS              ;ALL DONE!
                        34     TEMPY     DS    1

--End assembly--

50 bytes

Errors: 0

Symbol table - alphabetical order:

?  DEMO3   =$6000      HCOLOR  =$08BD      HGR     =$0865      HLINE   =$091A
   HPOSN   =$08D3      INIT    =$0803      LOOP    =$600F      TEMPY   =$6031

Symbol table - numerical order:

   INIT    =$0803      HGR     =$0865      HCOLOR  =$08BD      HPOSN   =$08D3
   HLINE   =$091A   ?  DEMO3   =$6000      LOOP    =$600F      TEMPY   =$6031
```



GraFORTH

Product:	GraFORTH
Use:	Language for 3-D Graphics programming
For:	Apple II family
Company:	INSOFT 10175 S.W. Barber Blvd., Suite 202B Portland, OR 97219
Includes:	Disk and manual.
Price:	$75.00

Jeff Harper

I HAVE an interest in graphics programs for the Apple—in particular three-dimensional graphics. My experience with computer graphics includes Computer Aided Design/Computer Aided Manufacturing (CAD/CAM), both with solids modeling and wire-frame, surface geometry systems. In reviewing graphics application programs that run on the Apple, I am almost always amazed at their capabilities. The *GraFORTH* language is no exception, and it exceeded my expectations with regard to its three dimensional animation features.

GraFORTH is a compiled language which can be executed in either the "immediate" mode or the "deferred" mode. In the immediate mode, GraFORTH statements are typed on a single line and executed with the input of a carraige return. In the deferred mode an editor is used to create the lines of code prior to compilation and execution. GraFORTH provides three editors with the language:

1) The Text Editor
2) The Character editor and
3) The Graphics Editor.

Since the GraFORTH language uses Apple DOS commands and file structures, a program can be written in text file format using an external editor.

GraFORTH is an integer-only language, written with high speed program execution as one of the primary objectives. The language has very few error checking routines or diagnostics. Compilation directly to 6502 machine language results in a much greater execution speed than can be obtained with an interpreted language. The result is a language that allows a great deal of user control and speed at the expense of programming safety features.

Writing A GraFORTH Program

The approach to writing a program in GraFORTH is significantly different from writing a BASIC or FORTRAN program. However some of the modular techniques which come naturally in the creation of a GraFORTH program are similar to those which are considered desirable in designing a good BASIC or FORTRAN program.

The GraFORTH Language is composed of two primary parts— 1) the compiler and low-level system routines, and 2) the word library. Writing a program using GraFORTH is accomplished by defining a "word." Words can be programs, subroutines, variables or strings. Programs are created by stringing words together. This technique of building up a program by first defining lower level words lends itself to a modular program structure which requires less program debugging. Lower level routines (words) are tested and verified when they are created. Programs are built by combining proven routines, and the GraFORTH language comes with a library of words to start your program. These are listed and defined in the document or they can be listed on the screen with the LIST command. New words, which are user-defined, are added to the Word Library. When operating in the immediate mode, words are separated by a space, then compiled and executed with the input of a CR.

GraFORTH differs from more conventional languages in its use of a data stack and the "Reverse Polish Notation." All numbers entered to the system reside on the data stack. In GraFORTH the last number entered goes on the top of the stack, the number previously occupying the top of the stack is pushed down to the second position on the stack. Manipulation of the numbers in the stack is done with GraFORTH words. For example, a GraFORTH word "SWAP" will replace the top number on the stack with the second place number:

```
READY 13 6 7
7
6
13
READY SWAP
6
7
13
```

The number 7 was the last entered number in the first line above, therefore the top number on the stack. After the SWAP command the number 6 replaces 7 as the top number. Numerous other words are available to control and manipulate the numbers in the stack. Arithmetic words are used to perform arithmetic operations using the Reverse Polish Notation.

If all of this seems confusing or difficult, it really isn't. Like anything else that is new, it takes some experimenting

to gain confidence; but the structure of the language permits the testing of low level routines (words) as a program is being developed.

A looping capability is also included in the GraFORTH language and nested loops are set up by defining a GraFORTH word. Decision and branching, conditional tests are provided. Five functions for conditional testing include:

1) IF–THEN
2) IF–ELSE–THEN
3) BEGIN–UNTIL
4) BEGIN–WHILE–REPEAT
5) CASE:THEN

Logical features are provided for comparing numbers, and GraFORTH is a recursive language (i.e.,GraFORTH words can call themselves).

Character Display

Character creation and display is one area where GraFORTH really excels. The language comes with seven different character fonts. To generate your own font a special Character Editor is provided to make character generation easy. Upon execution the Editor displays a list of commands to the right side of the screen. Any desired command is activated by a single letter. To make modifications to a character set the user simply specifies its location address. One character set is active at any one time. The editor conveniently displays the current character set across the bottom of the screen. Characters created by moving the curser, then drawing points and lines to make the character: "P" plots a point to the current curser location. Characters may also be created in color.

Character sets may, of course, be saved for later use. Once your character set has been defined, GraFORTH permits their display in 8 different sizes.

Graphics

The GraFORTH language contains both a 2–D and 3–D graphics capability, as well as the character graphics capabilities described above. The 3–D graphics features provide high speed animation by alternating between the two High–Res graphics pages available on the Apple.

Two–dimensional "words" include Plot, Line and Fill. The following example would be used to plot a point at the cartesian coordinates x = 30, y = 50 and draw a horizontal line of length 20 from x = 20, y = 30 to x = 30, y = 30.

```
READY 100 50 PLOT
READY 20 30 POSN
READY 30 30 LINE
```

Again, this example first places the x and y values on the stack, then removes those values with the appropriate 2–D word. Points and lines created may also be done in various colors. Six colors are available. Rectangular areas may be filled in with colors simply by using the word FILL. The fill word uses the last plotted point as one corner of the rectangular region and two values (X and Y) removed from the stack as the coordinates for the other corner.

Lines and points may be selectively removed from screen display by using the UNPLOT, UNLINE and EMPTY words or the entire screen can be erased using the word ERASE. The GraFORTH language also provides an "ORMODE" and an "EXMODE" for graphics displays. They allow for the creation of graphics objects that appear to be in front of or behind other objects. These functions are useful in the creation of animated objects and the display of their relative positions on the screen.

GraFORTH also provides as a 2–D feature, Turtle Graphics. Turtle Graphics permits the creation of 2–D geometry in a different manner. Similar to the Turtle Graphics concept of the Logo language, lines are drawn by moving a figure, shaped like a turtle, around the screen. Movement occurs with the MOVE command and a specified number of pixels for the move. The Turtle's direction is controlled by specifying a TURN command and the rotation angle in degrees. PENUP and PENDOWN commands permit movement of the turtle with and without drawn lines.

Three–Dimensional Graphics

The 3–D Graphics capabilities are the most impressive features of the GraFORTH Language. Objects are created by defining line endpoints in cartesian coordinates in a range of from –128 to +127 in any direction (x,y,z). GraFORTH provides an Image Editor to facilitate object creation. Once an object has been created it can be loaded into memory, displayed, and manipulated with GraFORTH words. GraFORTH has 12 words for changing the position, size and orientation of the geometry.

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Any object can be rotated about either the X-axis, Y-axis, or Z-axis. GraFORTH uses units from 0 to 256 rather than degrees for rotation. As an example to rotate an object 90 degrees about the X-axis the user would input the command:

```
READY 64 XROT
```

In this example the object is rotated in real time. 90 degrees about the X-axis, then stopped. A continuous motion can be achieved by defining a word to repeat the rotation. The following example demonstrates the ease with which a continuous motion of an object can be programmed with GraFORTH:

```
READY :  YSPIN
         260 0 DO
         I YROT
         4 +LOOP ;
```

In this case the object will be rotated a full 360 degrees, one time. The loop parameters are established with 260 0. The 1 value is incremented by 4 with each execution of the loop. This example can be further expanded as follows:

```
READY :  DOUBLESPIN
         2 0 DO
         260 0 DO
         I YROT
         4 +LOOP
         LOOP
```

The newly defined word "DOUBLESPIN" could be created more easily using the previously defined word "YSPIN" (modular programming techniques):

```
READY :  DOUBLESPIN
         2 0 DO
         YSPIN
         LOOP ;
```

Three dimensional objects created using GraFORTH can be displayed orthographically (geometric entity will appear the same size regardless of its distance from the viewer) or with perspective (as the eye would view it, with a vanishing point). GraFORTH provides both a positive and negative perspective which allows for some very interesting effects. In the case of negative perspective the front of an object will be larger than the back.

Objects can be translated as well as rotated. Animation is achieved in a fashion similar to the example shown above. The translation is made in the three dimensional space using the words: XTRAN, YTRAN, or ZTRAN. Both an absolute motion of the object (from its current position to a specified point) and a translation along one of the coordinate axis can be specified. The absolute motion is achieved by specifying XPOS and YPOS.

Additional 3-D graphics parameters include scaling, in either the X or Y direction independently or in both directions simultaneously. A color word "OBJCOLOR" is used to define the color of the objects.

In addition to the wire-frame, 3D graphics format, GraFORTH also provides a program called PROFILE. This program has the capability of creating a surface of revolution. The curve of rotation is determined by entering X,Y coordinates with the revolution taken about the Y-axis. Once a surface of revolution has been defined, it can be saved on disk with an object name and used in GraFORTH programs just as a wire-frame object would.

To augment all of these 2-D and 3-D graphics features which make the creation of animated games with the GraFORTH Language a somewhat straightforward task, a music function is also included. Notes generated by GraFORTH may be played in nine voices. Both the pitch and duration of notes is controlled by GraFORTH words.

Summary

The GraFORTH language is a powerful graphics programming system that can be a great deal of fun. Its modular format, Reverse Polish notation, and data stack structure provide the user with a different approach to programming, but one which most users will find both challenging and rewarding. The three-dimensional graphics and character display features are simply exciting (I know of at least one popular game on the market which was written with GraFORTH). The document is well written and partially tutorial in nature. I believe it is simple and detailed enough to allow even the novice programmer to understand, and would therefore recommend it to novice and expert alike.

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APPLEWRITER II AND VISTA-VISION-80

Q. *I recently purchased a used VISTA VISION-80 eighty column card. When I bought it, I thought I would be able to use it within Applewriter II, but I can't figure out how to do it. My question is, what can I do to enable me to use this card with Applewriter II? Is there a software patch I can apply that will permit me to use my card? Failing that, I have heard of the VIDEX 80 column pre-boot. Will that work with my card? One final question, if I obtain the Dan Paymar lower case adapter, will I be able to use it from within Applewriter II? Thanks for your help.*

A. To answer your questions in mostly random order, Applewriter II and *II*e and most other commercial programs are copy protected. This means that you are prohibited from copying as well as "protected" from modifying the program. Thus it is not possible to apply software patches unless you first defeat the copy protection. There are some copy boards on the market to do this but you are still left with the problem of modifying the software and this is best left to an expert. So, you will not be able to use the Dan Paymar adapter nor your VISION-80 card without a pre-boot disk. A pre-boot disk is a disk that is used to start your system and then you run your program, Applewriter in this case. The pre-boot disk temporarily modifies the program to work with the 80 column card. Every time you want to run the program you will have to start up with the pre-boot disk. Unfortunately the VIDEX 80 column board works differently than your VISION-80 board and the Videx pre-boot disk will not work. You should contact Vista to see if they have a pre-boot disk for Applewriter II and your card.

STRETCHING THE SPREADSHEET

Q. *Three questions regarding THE Spreadsheet 2.0: (1) Can this program be set up to access a IIe extended memory board for the additional 64K memory? (2) Is it possible for a @IF to return a blank cell? Note this is different from the NA function. (3) Is there a sort routine available? There was a program published in* Nibble *(January 84) to sort a Visicalc DIF file by generating move commands that are then loaded in. Would this work with THE Spreadsheet?*

A. There is a new update of THE Spreadsheet 2.0 that will access the extra memory on the *II*e extended 80-column card. This update is available from the manufacturer for $10.00. Send your THE Spreadsheet 2.0 disk and payment to: ArtSci, 10432 Burbank Blvd.,North Hollywood, CA 91601 for updating. [*Ed. note: THE Spreadsheet 2.0 currently offered in the new A.P.P.L.E. 1984 Products Catalog includes this update.*] For your second question, @IF cannot return a blank cell. The sort routine published in *Nibble* will work with THE Spreadsheet 2.0. THE Spreadsheet 2.0 uses standard DIF files for information exchange so any utility that works on DIF files should also work with THE Spreadsheet 2.0.

PRINTING 80 COLUMNS

Q. *Is there a special statement needed to get the printer to print out in the 80 columns on the Apple IIe?*

A. There is a lot of confusion on this subject. (I am also somewhat confused by your question. Let me answer the general case of how to print 80 columns from the Apple.) If you are programming in Applesoft (][+ or *II*e) you can print lines up to the maximum length of your printer without any special statement. If you type PRINT " followed by 80 X's and end quote (") you will get 80 columns printed on your printer. If you list your Applesoft program it generally will be listed with a maximum of 40 characters per line. To change the listing to 80 characters per line use the following Applesoft command: PRINT CHR$(9)"80N" after your have turned your printer on with PRINT CHR$(4)"PR#1". This will usually work but it does depend on your printer interface card. If you have a non-standard card and it doesn't work, look in your interface card manual (often this is only a few pages long) to find the proper command.

Since the above information may not answer your question fully, let me continue. If you want to print to your printer while in the 80-Column mode on the *II*e you should first deactivate the 80-column card and then turn on your printer. Apple says on page 26 of the 80-column Text Card Manual:

> "Typing PR#0 or PR#6 on an Apple *II*e while the 80-Column Text Card is active causes unpredictable results and a confusing display. If you want to use peripheral cards such as for a printer in slot 1 or to use the PR#6 command, you must always deactivate the 80-Column Text Card first."

I have also had problems on occasion with printing from within a program with the 80-Column card active. If you are typing from the keyboard, to deactivate the card type ESC then CTRL-Q. If you a running a program execute PRINT CHR$(21) before turning on the printer. When you are through printing return to the 80-column mode with PRINT CHR$(4)"PR#3".

TOUGH TABS

Q. *In Applewriter IIe I have trouble getting the second line of an indented sentence from tabbing to the previously made tab setting. In other words, when making an outline with a series of 5 spaces, 10 spaces, 15 spaces tab settings, the wrapped around line of a 10 space setting goes back to the left margin and won't move over to the 10 space setting. Any help would be appreciated.*

A. You are exactly right! The tab settings are for convenience when typing in material. Think of them as a shorthand way of typing in a bunch of spaces. They have no effect on the next line. What you want to do is to change the left margin. This is not actually too difficult. Everytime you want to indent include .lm+5 in your text and the margin will be moved in 5 spaces to the right from it's present position. When you are done with that piece and want to outdent back to the the previous position include .lm–5 in your text. You can include the .lm+5 in your glossary so you only have to type a single character to indent. Of course you could use the absolute value for the left margin, i.e. .lm10, .lm15, etc. but if you later decided to change the overall margin you would have to go back and change all the .lm commands.

SHIFT SOLUTION

Q. *When using Applewriter II with a IIe how do you get the shift key to shift?*

A. To use the shift key on a *IIe* with Applewriter II you need to put Applewriter II into the upper–case–lock mode. You can do this by typing CTRL–k U. Now release the caps lock key on the *IIe* and type away.

WHAT IF IT STRIKES TWICE?

Q. *Are power surge devices really needed in the average home? If so, what type? What cost?*

A. There are a number of opinions on this; my feeling is that it can't hurt. If you have relatively clean power—and refrigerators, air conditioners and the like don't seem to bother your Apple when they turn on or off—maybe you don't need one. Most of the products on the market, however, will not help much if lightning strikes the power line. The best solution is not to use your computer during a thunderstorm, or better yet, unplug it. Of course if lightning only strikes near the power line a power surge protector could help. There are various devices on sale and they fall into two basic categories. The least expensive only have power surge devices (varistors) across the power line. This will protect against spikes on the power line and is usually all you need. These range in price from $20 to $70 and all are based on a $2 varistor. I don't see that the more expensive ones are any better. For really low cost you can buy varistors at Radio Shack and make your own out of an extension cord. The second class of protectors have varistors and EMI (ElectroMagnetic Interference) filters. If you live close to a TV station or have a neighbor with a CB it might be desirable to have an EMI filter. These devices usually run $70 and up. For the average household the EMI filter is probably not worth the money.

EPSON PAPER ROUTE

Q. *On my MX–80FT printer, the paper sometimes gets out of alignment and curls up. What can be done to keep it properly registered?*

A. As far as I am aware the Epson doesn't have any particular problems with paper registration. However most printers that accept both friction feed and pin feed paper have a platen control lever. When the printer is used with pin feed paper the platen control lever should be set to release the rollers on the platen. Except for the holes on the side of the paper engaging the pins on the platen, the paper should move freely. Having this lever in the wrong position is usually the cause of paper jamming.

APPLE HOT–ROD

Q. *What speed–up boards are available for the Apple? Do they work on binary programs or just Applesoft?*

A. As of this writing (late April) there is only one board available, the Accelerator. This board was originally designed by Number Nine and is currently being sold by Saturn Systems, now renamed Titan Technologies, Inc. Other boards have been advertised but they are not delivering on a regular basis. The Accelerator contains a fast 6502 processor and 64K of high speed memory for use with the processor. The regular Apple memory cannot be used with the Accelerator because it isn't fast enough. If you have the extended 80–column text card the extra memory on that won't work either. The Accelerator will speed up all kinds of programs, binary as well as Applesoft, because the faster 6502 processor effectively replaces the one in your Apple. Titan claims the speed improvement is 3 ½ times. This is the best it can do. If you have a lot of disk access the speed improvement will be less because the disk must continue to run at it's original speed. Titan advertises in the major Apple magazines, and its address is 310 West Ann Street, Ann Arbor, MI 48104.

MICROMODEM ON 80

Q. *I've got a IIe into which I put a Micromodem II from a][+. It works fine in the 40 character mode, but I can't get a blinking cursor in 80. I presume this is a software problem. If so, is there any public domain software that will work?*

A. The problem is that the Micromodem II firmware accesses only the

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40–column screen. You would have to write your own routine to replace the firmware. The firmware in the Micromodem *IIe* works similarly so no help there either. The Hayes Terminal program will handle 80–columns, but of course is not public domain software. Any readers know of an 80–column terminal program for the *IIe* and the Micromodem?

SUPER-SERIAL DOUBLE-DUTY

Q. *I have an Apple IIe with a Super–Serial card for interface with my printer. While I realize, the Super–Serial card can be used in either the Modem or Terminal modes, is it possible to use it for both purposes (one at a time) without changing the jumper block? In essence my question is this: Is it necessary to change the jumper block on the Super–Serial card from terminal to modem, if the cable connection is configured properly? What software is available for this purpose?*

A. The jumper block reassigns some of the signals from the circuitry on the Super–Serial card to different pins on the connector. For example a terminal transmits data on pin 2 and receives data on pin 3. A modem is designed to connect to a terminal and thus receives data on pin 2 and transmits data on pin 3. This is a long winded way of saying yes, you can use the Super–Serial card in either way simply be properly wiring the cable. In fact most other serial cards require that you rewire the cable for each different device. Since the only difference is in the pin connections, there is no special software needed other than what you would normally use to run your printer and modem.

PRINTER CONTROL

Q. *How can one write a format file to change parameters (e.g. change margins) for the Imagewriter printer?*

A. A format file, as defined by Apple, contains control codes that set up the printer for specific jobs. It is not a different kind of file but rather a text file that can be used with a word processor or even a BASIC program. When you turn on your printer (any printer, not just the Imagewriter) it sets certain default printing characteristics, i.e. 6 lines per inch vertically, 10 characters per inch horizontally, unemphasized or regular characters, left margin at zero, etc. Suppose for example that you are using your word processor to type letters, and you always want the printer to print in the 12 character per inch mode with a horizontal tab at column 50. You could keep the appropriate control codes in a file that loads into your word processor. If you keep the codes in a separate file you won't have to type them in each time, just load the file, print it and presto your printer is initialized. Or, you could write a short Applesoft program to setup the printer, then this would be your format file. The following program will set the Imagewriter to 12 characters/inch with a tab at column 50.

```
100  PRINT CHR$(4)"PR#1" :
     REM FOR PRINTER IN
     SLOT 1
110  PRINT CHR$(27)"E" :
     REM SET 12 LPI
120  PRINT CHR$(27)"(050." :
     REM SET TAB
130  PRINT CHR$(4)"PR#0" :
     REM TURN PRINTER
     OFF
```

While we're on the subject, a short tutorial on printer control codes might be worthwhile. I get a fair number of questions of the type "How can I set my printer to ——— from Applesoft" or ". . . from my word processor." To operate the advanced features on most printers you need to send one or more control codes and possibly a character or two to the printer. In the above example, to set the printer to 12 lines per inch, the manual says to send ESCAPE E. In the Applesoft Reference Manual (also in the printer manual) the ESCAPE control code is found to be ASCII code 27. Thus, to send ESCAPE E from Applesoft PRINT CHR$(27)"E." Sometimes the printer manual will just give you the code number rather than the name. This creates no problem from Applesoft, as the CHR$ function works with the number not the name. Most word processors however have a special method of embedding control characters in the text. For Applewriter *IIe* you first press control–V. Then any control character you type, ESCAPE for example, will be entered into the text rather than being treated as an Applewriter command. (ESCAPE is the key labeled ESC on the Apple keyboard. Applewriter II works the same way as Applewriter *IIe* for all control characters except ESCAPE. ESCAPE must be pressed 3 times from Applewriter II to enter it once into your text.) You must then press control–V a second time after you have typed the control character to get back to the regular text mode. For the above example you would type this sequence in Applewriter *IIe*: control–V, ESCAPE, control–V, E. This is fine until you run across a printer manual that says: to do underlining, send the following characters, CHR$(27)"X". What they are telling you is what the Applesoft command is to set the printer, *not* what you should type into your word processor. The CHR$ is an Applesoft function that prints the ASCII code enclosed in the parentheses. You need to find how to print code 27 from your word processor. This will probably require that you look the code up in an ASCII table (see your Applesoft reference manual) to find what keys to press on the keyboard. In this case we already know that code 27 is ESCAPE. For Applewriter *IIe* you would type: control–V, ESCAPE, control–V, X, with no spaces or punctuation between the characters.

ONE AT A TIME

Q. *Is there a patch for WordStar (using Apple CP/M) to use two printers? I want to tell WordStar to look for the LIST device in slot 2 when I'm using my letter quality printer. I want to put my serial interface card in slot 2 and leave my parallel interface card in slot 1 rather than having to open up the Apple and change cards in slot 1 whenever I want to change printers.*

A. I'm sorry, with CP/M there is no way to use two printers with two interface cards in different slots. There are some multi–function cards available that will run two printers (not simultaneously) from one card. You would have to have two versions of WordStar, each configured for the desired printer, and you could run whichever version you wanted. I know of two multi–function cards that have been made, but one company (SSM) has gone out of the card business, and the other (Mountain Computer CPS) may not work with CP/M. Make sure that the card you are interested in will work with CP/M before you buy it.

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This is just one of several decisions you have had to make this "month." There was that cosmetics company you could have bought for $600,000. You turned that down. But you swept up all available stock in WSTV Broadcasting Company when you saw a chance to capture a controlling share of a rising star. The economic outlook is getting more complex all the time, but with your experienced insight you were able to cull those stocks which might perform poorly in the future.

Down the hall, Jenkins silently competes with you. He, too, manages a portfolio for First Trust. A day of reckoning will come when your results will be compared with Jenkins'. If you do better than he, future employers will pay a premium for your investment management services.

For several hours now you've sat at your computer making financial decisions in an atmosphere of increasing uncertainty. It is now some 30 "months," or turns, into the game. You have $12,723,000 in cash and your company wants to see you play the commodities market. Which way will you go, and how much?

This is an ambitious game, both to write and to play. Let me get right to the point. I think it has more lasting entertainment value than the garden-variety, shoot-em-up arcade game. "Portfolio" is the best text-type game I've seen since "Zork." Otherwise, there is little similarity between them. It is in a class with "Millionaire," which I have not played. I did see "Millionaire" demonstrated for the Macintosh at the Chicago computer fair in May, and I remember thinking that "Portfolio" running on my Apple][offered no less fun.

So there. Ambitious game players, here's one to add to your collection.

"Portfolio" allows you to experience something like investment decision-making in the real world. There are 15 stocks to choose from. These go up and down in response to economic conditions, which change unexpectedly during the course of play. You have limited assets, and a limited number of decisions you can make during each turn. Though the manuals tell you all you need in order to play, they don't tell you how to excel. You gain that knowledge only by experience.

As a game, it's fun. In the documentation, the publisher suggests that "Portfolio" can have an educational use, teaching the inter-relatedness of economic and stock market events, and encouraging the development of foresight based upon knowledge. I can see that, too.

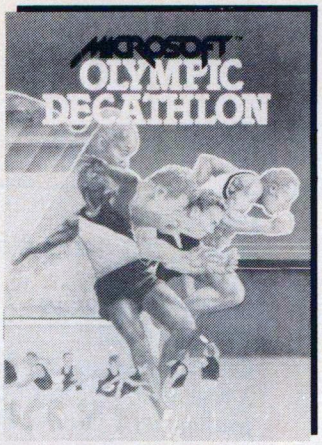
Here is the point where I would put forward the only cautious comments about an excellent product. The real economy is never quite so clear-cut as in "Portfolio." Players may get a sense of what investment decision-making is like, but the typical individual investor will have none of the ability to influence the market the way he or she does in the game. Lastly, the rules of relationship between the various elements in "Portfolio" can gradually be perceived by an alert and experienced player of the game. The real securities markets are not so kind. About the time you think you have things figured out, the nature of the market's response to events may abruptly change.

The caution in simple terms is this: play "Portfolio" for the fun of it, but don't expect to learn any mechanical secrets for wealth on Wall Street. To his credit, Harris Dvores, the author of "Portfolio," does not claim any more than his program can deliver: a sense of how the economy works and an awareness that today's actions have consequences in the future.

It almost seems anticlimactic to climb back down to the mundane, technical level, but "Portfolio" really shines here. The documentation asserts that the game is "over 100K" of code. Fitting that into any Apple][,][+ or *//e* with at least 48K of memory and one disk drive was a neat trick.

Are there any technical or stylistic points on which I disagree with the program's author? Tiny ones, fully disclosed in the documentation along with the reasons why they are there and how you can cope with them. Nothing to dwell upon.

"Portfolio" is an achievement. I've had it around the house for months. Why didn't I write the review sooner? We have to mail the programs back to A.P.P.L.E. when we're finished, and I didn't want to stop playing.



Olympic Decathlon

Product:	Olympic Decathlon
Description:	Recreation/learning game
For:	Apple II family
Company:	Microsoft 1700 Northup Way Bellevue, WA 98004
Price:	$29.95

Eric Flescher

AS YOU watch track and field events at a school meet or at this summer's Olympics, you may ask yourself: What's it like to be in competitions like that? How well could I do in events such as the high jump, javelin throwing, shot-put and other events? If your adrenaline is flowing and you want to experience the excitement and the thrills of the Olympic competitions, then *Olympic Decathlon* is for you.

Besides the desire to compete, you will need an Apple computer with at least 32K, a TV or monitor (color suggested), one disk drive, and a pair of game paddles. The program works on all members of the Apple II family.

After booting up, you are greeted by nice musical sounds (not the Olympics as I know it), while the beginning title and the details and history of the (original) Decathlon are explained. (If you are using the new Apple *//c*, turn the volume control to an appropriate level before booting up. Mine was too low and I thought I was hearing strange noises!).

The introduction gives a general overview of the Decathlon competitions—a ten event, two day marathon contest—of which the winner is deservedly crowned as the world's greatest athlete.

This computerized version of the contests allows you to compete alone or with other contestants. As in the real event, you are awarded points based on your finishing times, distances or heights. The standings after each event are displayed as you proceed through all the events. The final standings are ultimately determined by the total points scored in each event. Basically head to head competition in each event is not all that important. A player could score fairly well, on an average, in all events, and still end up the world's greatest athlete, as Bruce Jenner did in 1976. With that in mind, the contests can begin.

You enter your name(s) and then line up at the purple starting line for the first event, the 100 meter dash. You run a race along the oval track, set amidst a green field, by pressing the appropriate keys. You view the race from an overhead position. A timer gives you feedback on your time, and then if you'd like, you can compare your standings to the other contestants.

The next contest, the long jump, takes place on a blue and orange track. You have three trials and each time you can observe your results via a side view. It's a challenge to try to manipulate the right keys to run, stop and land. If you don't take off at the right time, or take off at the wrong angle (as I did several times), the contestant falls over onto the track and the computer says, "you fell flat on your face! ". I found this quite amusing but I still wanted to do it right. When you land successfully, your jump's distance is displayed. Practice makes perfect.

The third is the shot-put. I found this to be one of the hardest and most challenging events. Using the paddles, you have to adjust the angle of the competitor's throwing arm in throwing the metal ball. Once the ball is in flight, the computer switches to a green field where you see the trajectory and the distance. This takes a while to master.

By pressing the right sequence of keys, you can achieve the next event, the high jump. You are given a choice of the running distance to the bar and the height at which you would like to clear. A combination of speed and take off skills are needed. If you get the right combination, you land safely in the foam rubber pit. If not, then you run into the bar or see it fall.

In the 400 meter dash, you race around the track in your appropriate lane by pressing two keys in succession, as fast as you can. As you speed around the oval track, the symbol, representing the runner(s), turns you in the right direction. Speed is the name of the game in this event and it depends on how fast you can get your fingers moving.

The 110-meter hurdles are difficult, yet challenging. You alternate hitting a series of keys to run and jump the hurdles. I kept running into the hurdles (it's hard to time the leaps), and each time, the screen figure was shown knocking them down and stepping over them. Eventually the screen display indicated that I had knocked too many down and was disqualified!

I found the discus throw one of the more difficult but pleasurable events. It's complex in that you have to gauge the right speed at which the figure twirls and the right spot and the timing when you release the discus. Several times my discus went flying into the nearby cage! I did succeed, however, and the discus made a safe flight and landing, which was displayed on another screen.

The hardest event of all (in the real Olympics as well as in this program)—the pole vault—came next. Why is it so difficult? First you have to give yourself enough of a running distance (to the bar), while adjusting the tilt at which you hold the pole (upwards). As your figure appears, you need to continue forward at the right speed, grip the pole at the right part for leverage, plant the pole at the right spot in the ground and then lift yourself up and over the bar for a safe touchdown in the foam pit. Easy enough I

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(Available to members only)

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thought. It wasn't. It took several attempts. I ended up falling backwards or crashing into the bar before sailing over the bar safely. This takes more then a little practice and it certainly is a challenge to hit the correct keys at the right time.

In the javelin throw, you adjust your running speed and the angle at which you will let the javelin travel. The javelin flight then is shown on a green field and you see your total distance covered by your throw. This was one of the easier events to master,but getting a real good distance took some work.

In the last event, the 1500 meter run, you alternate the pressing of four keys that allow you to negotiate the turns in the track. It does take a little while to learn how to do this. But just like all the other events, the more practice, the better you can become—also the smarter you become in dealing with the idiosyncrasies and achieving success in all of these computerized events.

At the end, the points are totaled and the winner is crowned. If you are the only contestant, you are annointed the winner no matter how well you did.

The program itself gives helpful feedback and instructions. The only weakness I saw was that, in certain parts, the program did not indicate the choices of feedback to choose from (y or yes etc.), which may cause momentary confusion. The graphics are excellent and extremely accurate in detail. The program also provides for the many situations that happen during all of the events. Also, nice humorous touches are given to soothe your ego when success is not achieved. These added to the overall enjoyment of using the program and for which the author should be commended. These help you learn from your initial attempts and serve to give one further initiative to try again.

The 33 page booklet is well written and nicely documented. The instructions and graphic illustrations are helpful and easy to comprehend. There are also a series of hints and suggestions along the way, that give advice on how to improve your performances in the events. Many of these were short yet very sound in their technical guidance.

Olympic Decathlon lets you realistically enjoy Olympic competition any day. Adults, as well as older children, will find it a fun learning experience. It keeps you interested, allowing you to proceed at your own difficulty level and pace. More importantly it challenges and helps you in a creative manner by allowing various ways to successfully compete in each event. Just like the real events, you have to take into account your strengths, style of play and other factors per event. You can use science and math knowledge or rely on your intuition.

I'd also rate this program a best buy, not only because of its price and the other features I've outlined but for its ability to provide for this ongoing challenge. You may never pole vault or throw a discus or compete in those events, but at least you can say that you have tasted such competition. Also possibly you will better empathize with the athletes on the difficulties of training and perfecting the skills needed to achieve in each event.

Practice makes perfect and *Olympic Decathlon* could be the program that allows you to train and achieve that ultimate goal of becoming known as the world's greatest athlete. Try it for the excitement and the realistic feel and thrill of international competition. Then set your sights for the Olympics of 1988.

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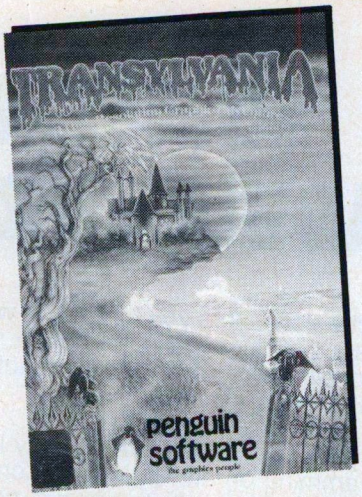


Transylvania

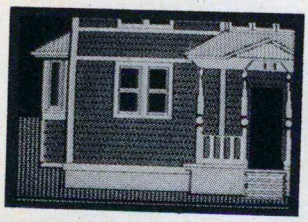
Product:	Transylvania
Description:	Adventure Game
For:	Apple II family and the Macintosh
Company:	Penguin Software P.O.Box 311 Geneva, IL 60134
Price:	$39.95

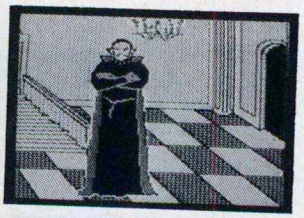
Transylvania *for the Mac is available through A.P.P.L.E. for $25.50.*

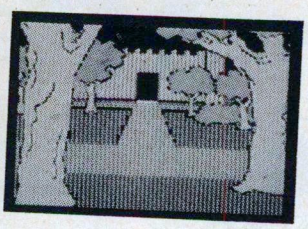
Larry Neibauer

Far away a bell tolls the last stroke of midnight, while you alone stand at the beginning of a path leading toward an uninviting forest to the North. Before you stands an ancient tree stump covered with faint writing. You've tried everything in your power to read this writing, looking for clues, hoping to find something that will help lead you to her. But, for this night at least, this ancient stump and the darkness seem unwilling to reveal their secrets. You swallow hard and begin your journey into the unknown. Knowing that you may never find her. All the while knowing you may never return.

Stumbling in the darkness, you find your way to a place where paths converge from all directions. What's this? A wrinkled note which reads. . . (You wouldn't really want me to tell you what the note says would you?). But the urgency of your situation—of HER situation—is now overwhelming. With total abandon and disregard for your own well being, you gather your courage and continue on into the darkness. Suddenly, a wolf howls in the distance. . .



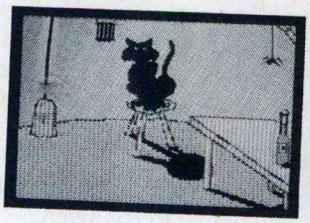




You should have known from the beginning. The clues were all there when you first checked into *Transylvania*.

"Please sign the guest register". . . Your name?. . . AND your next of kin?

Welcome to *Transylvania*. This adventure/fantasy game for the Apple II family now contains a double high–resolution version for the Apple *//*c or *//*e with an extended 80–column card. And get this, there's a version for the Mac too! If you like adventure, mystery and a real challenge, then you'll probably spend hours playing *Transylvania*.



The problem is to find and rescue a fair "damsel in distress." The solution lies with your imagination, ingenuity, and LUCK. Few (if any) clues are given so you're entirely on your own. But half the fun is in learning how to talk to the game. Vampires, werewolves, swooping eagles and fat, little goblins are the creatures that prowl the night. Your tools and clues are spread all over the path laced forest. (By the way, the werewolf is the guy to watch out for.)

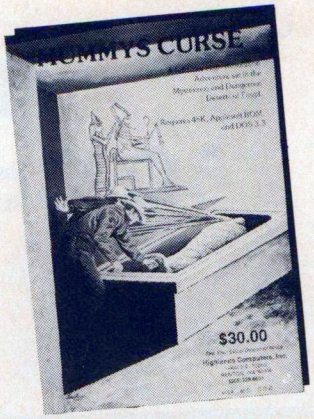
As for the graphics—I have to say that I was very impressed with these double/res versions! They really are high–resolution—sharp, crisp, and there is a good variety of nicely done pictures. But, as with all adventure games, you have to wait while the next picture is being loaded into the computer. It's the price we must pay, although I would like to tell you that the Mac loaded its pictures FAST!

The Macintosh version also differs from the II family version in screen format. The II's version puts the standard picture on the top with four lines of text on the bottom, while the Mac's screen devotes subtantially less space to the picture and uses Old English font style text. The Mac version also provides a compass so you can't get lost on the many paths that wind through the forest.

All in all, I really enjoyed playing *Transylvania*. Although I have to confess, I have yet to find her, this fair maiden. But I know she's out there somewhere—waiting.

. . . Far away a clock strikes three. . . Oh man! There's the werewolf again!. . . I wonder where the bullets are for this worthless pistol?

Mummy's Curse



Larry Neibauer

After having saved the princess from menacing werewolves and vampires, after having conquered all evil magicians and layed to rest every last fire breathing dragon in the kingdom, I can understand why you might find yourself wandering aimlessly through life, lacking direction or any sense of purpose.

Perhaps, on the other hand, you find yourself bursting with self-confidence, ready to take on yet another challenge, ready to conquer yet another evil foe. Should this be the case—I mean if you're really sure you're up to it—then you just might be ready for the *Mummy's Curse*.

Now, without sounding too negative, I have to say that the first time I played *Mummy's Curse*, I was a bit disappointed with a few of the hi-res pictures. However, as time went on, I discovered that the real beauty of the *Mummy's Curse* lies in the game play itself.

Picture yourself for a moment in the windblown, sun-scorched sands of the Sahara desert. Having gone without water for days, your body is burnt, your lips parched and cracked, your mouth bone dry. The heat is relentless and you've given up all hope—when suddenly you stumble into the sanctuary of a cool desert oasis. It is here that you will begin your adventure in the *Mummy's Curse*.

From the oasis you will search the desert for the clues, equipment and supplies necessary to recover the golden death mask of an ancient Egyptian pharoah, which is rumored to be in the possession of an evil and ill-tempered mummy.

Your quest will take you to the far corners of the Sahara, into old and abandoned crypts, deep into the convoluted tunnels and passage ways of the great pyramids, and even into the secret walkways of a nearby palace. (Say "hi" to the sheik for me!)

After you feel you have acquired all that you will need, it comes time to find the mummy's tomb and recover the death mask. Sound easy? Not by a long shot. If the natural obstacles aren't enough, there is always the mummy's curse to deal with. Actually there are three separate spells, each of which are fatal to you if you don't have the specific amulet to counteract the corresponding spell.

You must also constantly be alert for clues—they are everywhere—and you can't take *anything* for granted.

Mummy's Curse can be played on an Apple II,][+, //e or //c. It's a straightforward , no-frills adventure game, without whistles or bells, but it will definitely challenge you to the limits of your puzzle solving capabilities.

Product: Mummy's Curse
Description: Adventure Game
For: Apple II family
Company: Highlands Computer Services, Inc.
14422 S.E. 132nd
Renton, WA 98056
Price: $30.00

Mummy's Curse *is available through A.P.P.L.E. for $12.50.*

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The //e 80 Column Card

Cecil Fretwell

THE 80 column card manufactured and sold by Apple for the //e, either with or without extended memory, has some minor quirks. Notice that I use the word "quirks" and not "problems." In computereze, a quirk is a bug that usually can be programmed around or a feature which can be used to one's advantage.

Three Operating Modes

Apple's 80 column card lets the system operate in one of three modes. The first is 40 column mode and operates exactly like the old][+ in 40 columns. This mode is identifiable by the flashing checkerboard cursor. In this mode, the card is said to be inactive. All of the I/O hooks are into the monitor residing in $F800 to $FFFF. One major exception is that the cursor movement sequence (ESC I, J, K, or M) can also be accomplished by using ESC followed by one of the four arrow keys.

The card is made active by entering PR#3, which clears the screen and puts the 80 column mode into effect. The card is now said to be active, and the cursor becomes a solid, non-flashing "blob." All of the I/O hooks are now into the software on the 80 column card. If 80 column mode is active, you can switch to 40 column mode with the same non-flashing cursor by pressing ESC 4. The card is still active. Thus, the type of 40 column mode in effect can be determined from the appearance of the cursor.

With the card active, there are several things you can do to take advantage of its full power. For example, you can scroll the screen up or down. I like the idea of having the cursor switch to a + when ESC is used. This + reminds me that I am in ESC mode, something I would occasionally forget on my old][+ or in regular 40 column mode on the //e.

When the card is active, switching from 40 to 80 column mode is easy via ESC 8 from the keyboard. The 40 column display information is retained with the characters half as wide. Switching from 80 to 40 column is done with ESC 4. The right hand 40 characters of the 80 column display are permanently erased, since switching back to 80 column mode via ESC 8 does not bring them back.

Comma Complications

Now lets see how things can get fouled up. In the following discussion, unless stated otherwise, references to 40 column mode equally apply whether the card is active or not. Also, any references to BASIC mean Applesoft BASIC, since I have not tried the same ideas with Integer BASIC.

First consider the following innocent-looking statement:

```
PRINT 1,2,3,4,5
```

In 40 column mode one obtains

```
1  2  3
4  5
```

with the 2 in screen column 17 and the 3 in column 33. (Any references to screen columns in this article are physical columns unless otherwise noted. Physical columns number from 1 up, whereas internally, columns number from 0 up.)

Now switch to 80 column mode and execute the same statement again. One obtains

```
1  5
```

with the 5 in column 17. What happened to 2, 3, and 4?

When BASIC sees a comma in the PRINT statement, it is supposed to move the cursor to a position which is the next multiple of 16. Thus, in 40 column mode, the comma in the PRINT statement is supposed to provide tab stops at columns 1, 17, and 33. It does this by adding 16 to the current internal cursor position, stored in CH = $24, stripping off the lower four bits, and placing the result back into CH. Some additional comments will be made about this tabbing feature in a later paragraph.

In 80 column mode, conditions are different. When the card is active in either mode, it maintains three horizontal cursor positions. One is the standard CH in location $24. The second is called OLDCH which is the previous cursor position and is stored in $47B. The third is called OURCH which is the new cursor position and is stored in $57B. This is CH for the active card. Somehow these three different entities are supposed to keep everything clean—but they don't (for reasons too technical to describe here.)

Briefly, what happens in the above example with 80 column mode active is as follows. After the 1 is displayed, CH is pegged back to column 1 by the card. BASIC sees the comma and moves CH to column 17. The 80 column card causes the 2 to appear in column 17, then pegs CH back to column 1. BASIC sees the comma and moves CH to column 17. The 80 column card causes the 3 to overwrite the 2 in column 17 then pegs CH back to column 1. Get the picture? For the technically curious, the problem appears to be a bug in the subroutine called SETCH in the 80 column card software.

I have found no way to use the comma tabbing feature of the PRINT statement with 80 column mode active. In other words, one must use semicolons, SPC, etc. to format the screen or printer in the desired man-

ner. Don't use HTAB because it also has a quirk as will be discussed below.

Back to 40 column mode and comma tabbing for a minute. The stops at columns 1 and 17 always work. The tab stop at column 33 may or may not work depending upon the position of the cursor at the time the second comma is encountered by BASIC. In the first example, the 3 is in column 33. Now try

```
PRINT 1,2222222,3
```

and obtain

```
1    2222222 3
```

The 3 is in column 33 as expected. Add an extra 2 to the PRINT statement, i.e., try

```
PRINT 1,22222222,3
```

and obtain

```
1    22222222
3
```

One would think the 3 should be in column 33 of the previous line.

Before BASIC performs the comma tab, it checks the current position of the cursor. If the cursor resides in column 24 or less, BASIC adds 16 to the current cursor in CH, strips off the lower four bits of the result to form a new cursor position in CH. If the cursor resides in column 25 or later, BASIC moves the cursor to the beginning of the next line. I think the authors of BASIC made a mistake and meant to use column 33 instead of column 24 to decide whether or not to go to the beginning of the next line.

Tabbing Tribulations

The use of TAB or SPC in a PRINT statement does not appear to create any problems in either mode. BASIC merely sends the proper amount of spaces to the screen or printer. This assumes that the TAB or SPC is followed by a semicolon, the most logical syntax. Following either of them with a comma invokes the previously mentioned quirk.

HTAB seems to work fine in 40 column mode. In 80 column mode two situations must be considered. Let the argument of HTAB be C. As long as the value of C is 40 or less, HTAB behaves itself in 80 column mode. For example,

```
HTAB 40:PRINT 1
```

causes a 1 to appear in column 40. On the other hand

```
HTAB 45:PRINT 1
```

creates a blank line followed by the 1 in column 5 of the next line.

This can not be blamed on the 80 column card software. In the BASIC software, if the argument of HTAB is 40 or less, BASIC stuffs that argument into CH and proceeds. If the argument of HTAB is greater than 40, BASIC subtracts 40 until it obtains a number of 40 or less and stuffs the result into CH. Therefore, in 80 column mode, HTAB 45 and HTAB 5 are equivalent because they both produce a CH of 5.

Apple offers an easy solution. Instead of using HTAB C they suggest using POKE 1403,C–1. The reason for the C–1 is that internally the cursor runs from 0 upward instead of from 1 upward. Location 1403 is the OURCH mentioned earlier for the 80 column software. In 80 column mode I always use POKE 1403,C–1 instead of HTAB C because it saves me the trouble of having to worry about whether C is less than 41. Remember that this applies only to 80 column mode. Poking into 1403 does not work for either 40 column mode.

Just remember that one of the major quirks in 80 column mode is the use of the comma in the PRINT statement. No matter what you try, the comma may nail you. For example,

```
HTAB 20:PRINT 1,2,3
```

or

```
POKE 1403,19:PRINT 1,2,3
```

both produce the same result of

```
3    1
```

in 80 column mode.

Input Interference

The following is a quote from "Errata to the Apple][80–Column Text Card Manual" provided with Apple's *80–Column Text Card Manual*. "The 80–column card is not designed to support the standard Applesoft INPUT and GET statements, nor the underlying monitor KEYIN routine. Use of them can result in loss of program or data; use the blinking underline cursor routine or read HEX $C000 directly instead.

I have yet to discover what quirks are associated with this quotation. I have used INPUT and GET quite heavily in 80 column mode without any problems. If anyone has discovered a quirk they should drop *Call –A.P.P.L.E.* a line or perhaps Apple can shed some more light on the subject. I have looked at the blinking underline cursor routine they reference and find it to be rather complex. The not so experienced user of BASIC may have trouble using it.

Old 40 and New 40

There are some other quirks to be aware of. Now the two different 40 column modes must be differentiated. For discussion purposes, I'll call the flashing checkerboard cursor the *old* 40 column mode, and the solid "blob" cursor the *new* 40 column mode. The addition of lower case capabilities to all modes created some quirks with

Continued on P. 72

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Something Over 32 Bits

Questions & Answers About Apple's Lisa and Macintosh 32-bit Computers

Dave Redhed

We would like to encourage readers who are interested in Apple's 32 bit computers to send in questions they would like to see answered in this column. Write to : 32 Bit Questions, Call -A.P.P.L.E. Editorial Dept., 21246 68th Ave. S., Kent WA 98032.

Last month you responded to a question about the speed ratio between Lisa and Mac in a way that tells me you didn't read the Mac article in the February, 1984 Byte magazine very carefully. How about setting the record straight?

Thank you for your observation. You are quite correct and I apologize for not having the precise answer that was required. The processing speed of the Mac is a function of a three-way sharing of RAM access lines and the amount of time a particular program spends accessing RAM versus the ROM. The opportunity to access memory is split between the 68000, the video display, and the sound-output circuitry. The Mac will run at its full clock rate of 7.83 MHz only when executing code from the ROM, since the ROM is used exclusively by the 68000 cpu. When access to RAM is required, the 68000 speed is cut to about 6 MHz. I have not been able to find out if this is slowed further when the cpu is accessing memory while sound is being generated as well.

I have run two benchmarks comparing Lisa and Mac, and they show that the Mac times are between 85% and 90% of the Lisa times. Since both benchmarks ran exclusively out of RAM and with no sound generation, you would expect a figure of 83% (a ratio of 5 to 6). Given that the 6 MHz figure is an average speed, the benchmark results are consistent and understandable.

Has Apple forgotten all about Lisa? Will it end up being another Apple III?

For those who have seen the announcement at NCC this year, it is clear that Apple has not forgotten about Lisa. The new software is really first class and the price makes it a definite winner among all the "integrated" programs in the marketplace. Apple is pushing Lisa as a vehicle for running Macintosh programs and now you can utilize the hard disk on Lisa via the MacWorks program. Until the expanded Macs show up, Lisa makes a lot of sense as a way to run larger applications than Mac can handle.

Because of the multi-tasking features of Lisa, running multiple applications will always be a more efficient operation on Lisa than on Mac. Therefore, many people may choose to use Lisa and get the best of both worlds.

If you haven't seen the details of the new Lisa software, I would advise you to take a close look. The data integration has been greatly increased and some really classy features have been added, such as color output to an $800 ink-jet printer.

No, I don't think that Lisa will suffer the same fate as the ///. There are several fundamental differences between the two products and what has happened to them. The /// was

primarily a programmer's machine and Lisa is primarily an end-user machine. Whatever difficulties Lisa has are marketing-oriented, not technical. In addition, the Lisa was the start of a new generation of computers at Apple, not an extension of an existing computer. However, they do have one thing in common—both Lisa and Apple /// owners love their respective computers with a great passion.

I have heard a rumor that the 512K Mac due out at the end of the year will have color. How does that jibe with your estimate of a few years before Mac will have color?

I have heard the same rumor, and in one sense it does not jibe at all with my comments. I made an assumption that Apple was serious about sticking with their design requirements of price and portability. If they are able to put out this new computer and not sacrifice either of these criteria, I am just plain wrong.

However, I have also heard that the price of this new Mac is in the range of $4500. That is a pretty large price increment for a $2500 computer, and I believe this would put the Mac in an entirely different market. While I may not have made it clear in my previous remarks, my estimate was made on the basis of keeping everything else constant and just adding color. I still think it will be a while before you will see a $2500 Mac with color and enough memory to support serious applications.

What has happened as a result of your recent article on the demise of the Lisa Toolkit?

As of early July, I have received letters from 6 people—5 of whom express definite interest in pursuing the Toolkit. There is an additional activity which began after press time for the Toolkit article. Apple Computer decided to make a mailing to more than 150 people who had expressed interest in the Toolkit. The purpose of this mailing is primarily to inform them of the state of the Toolkit and just what its availability will be. Barry Haynes of Apple Computer, who has been trying to stir up interest in a Toolkit user group, wanted to know if A.P.P.L.E. would be interested in supporting such a thing. I talked to Dick Hubert about this and we decided to find out how many people are really interested and just what plans they have for the Toolkit or Clascal. I made up a questionnaire and Judy York, who is doing the mailing from Apple Computer, agreed to include my questionnaire.

This mailing occurred in late June and I expect to analyze the results during August. Whether or not A.P.P.L.E. carries this any further will depend on the results of the questionnaire. I personally believe that some kind of Toolkit/Clascal-oriented group will be formed, but just how it will be put together is quite uncertain. My invitation is still open to anyone who is interested. Even though this issue will not be out until after I begin the analysis of the questionnaires, I will be glad to send you one and put you on the list.

Some of the artwork I have seen from the Macintosh is really impressive. Why haven't I seen the same kind of products coming out from LisaDraw? After all, LisaDraw has been out for over a year.

There are at least two reasons—one technical and one not so technical. LisaDraw is primarily a geometry-oriented program, with only a few tools that an artist would find useful. MacPaint,on the other hand, has several tools highly suited to what an artist needs. In addition, there is a fundamental difference between the images which the two programs produce. LisaDraw (and MacDraw, when it comes out) retains all images in mathematical form and actually re-draws the pictures from the mathematics when you make modifications to what is displayed. MacPaint, on the other hand, has only the bits you see on the screen. Once you have drawn a rectangle and completed the operation, MacPaint has no way of telling that there is a rectangle on the screen; it is just a collection of bits that happen to look like a rectangle to you.

This difference is most evident when you draw two overlapping objects. In LisaDraw, the objects remain distinct and can be re-located with respect to each other. Once you have drawn overlapping objects in MacPaint, the result is the union of the two objects, much as you would have when using paint or pencils or crayons. (I wonder if this is why they called it Mac*Paint*?)

I used LisaDraw for about 8 months before I first encountered MacPaint, and for a short while I was really frustrated. I kept trying to compare the two by trying LisaDraw-type operations in MacPaint. Only when I realized that they were very different tools was I able to get comfortable with MacPaint. Trying to do art work with LisaDraw is like telling an artist that everything must be done with straight lines and other geometrical forms. The opportunity for creativity is just not there. Conversely, trying to do geometry on MacPaint is a totally frustrating activity with no grid lines or rulers and no ability to keep objects separate.

Now for the non-technical reason. For the first several months there were thousands of Macs out there in the hands of people eager to work on them and no software except MacPaint and MacWrite. Since most people love to doodle more than write, the result has been lots of MacArt. Even if MacPaint had been done for Lisa, I do not think that very much art work would have been done by the business owners of Lisa—though possibly by their children.

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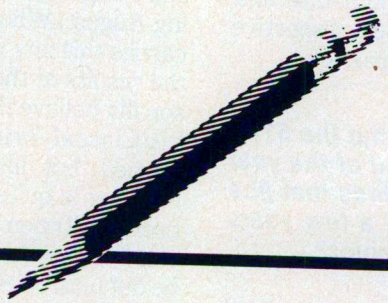

Dutch Treat

Publishing an absolutely excellent magazine like *Call –A.P.P.L.E.* and then allowing it to be read outside the U.S.A., for example in the Netherlands, is no less a crime than torture!

You people across the Atlantic don't seem to realize what you're doing to us: the reviews of products always just out of our reach, these stories of computer shows and Mac-Tuesday we can never visit, and most of all those tantalizing tales of telecommunications. We don't have a Source, a Compuserve, and—gasp—no Bulletin Board Systems in Holland.

Hopefully there's somebody out there who can help me set up a Dutch BBS, because there's nobody here that I know of who I can turn to for advice. I am especially interested in finding out how to obtain commercial or public-domain software needed to run a BBS. Any idea or suggestion is welcome.

Please help!

Desperately,

Thomas Fruin
Galgewater 38
2311 VZ Leiden
Netherlands

Music to Our Ears

This letter is written to compliment you on your June 1984 issue which had several articles relating to Music on the Apple computer. I remember when I first bought my Apple in the summer of '79 and became so enamored of it that I haven't been away from it for more than two weeks since that time. Back in the days when Apple was interested in its product, there was a disk called *Apple Contributed Programs* containing a program called the "Apple Organ". This fired me in the direction that I now call my hobby and (I might add) my money burner. My first attempt at putting sounds to the computer was from an early article in your magazine which told me how to click the speaker and, by using parameters, control the twitching that produced a sound. Since music had always been a part of my life, I proceeded to write a primitive program that would accept strings of note values and twitch the speaker with their particular values.

Next came a program to make sounds out of the game paddle port, which I implemented by buying resistors and capacitors and sticking the wire ends directly into the paddle ports' tiny slots. With alligator clips and wires running out to my stereo's auxiliary ports, my dad thought I was going to burn myself up. What a thrill it was when a scratchy organ sound of the Star Spangled Banner emanated from my speakers.

Enthralled, I left the cover off my machine with the outgoing wires intact for several months, believing that some day I might be able to program something to make this particular business more safe and palatable. Along came ALF (reviewed by Dave Kelly and Lee Webster in your June issue) with a 3 voice card that costs lots of money. I just had to have one. Later I discovered the 9 voice card and replaced my 3 with it. Once I even stayed up for almost 24 hours putting in some music (*Rhapsody in Blue* by George Gershwin) and set a personal record for staying alive at the keyboard.

I was in a store one day when a clerk started talking about Mountain Computer's Music System, which I purchased. This kept me happy for a while until several computer magazines showed how to interface a keyboard to the computer's memory, and thus add a true musician's touch. Naturally I had to have this sort of gadget, so I started to save my bucks and finally bought a Soundchaser. Glory, glory , for here I was in control of the musical output through a keyboard with all the bells and whistles needed to make me sound like a wizard at music as well as the Apple. I would recommend Soundchaser to anyone interested in using the computer to generate legitimate music.

Norman A. Haynes
14334 La Forge St.
Whittier, CA 90603

65C02 and Robotics

Call–A.P.P.L.E. has always been one of my favorite magazines and I look forward to reading it each month. I was particularly enthused with your May 1984 issue which included articles on two of my current favorite subjects: robotics and the 65C02. I would like to share with other readers some of my experiences on these two subjects and offer a few suggestions.

Dave Lingwood's article "A First Look at Apple's New *//c*" contains some comments about using the 65C02 in the Apple *//e* and][+ that do not match my experience. The Rockwell's 65C02 does run in the][+ without any problems, provided you use the 2 MHz version, and either the

1 MHz or 2 MHz version will run on the //e. Rockwell's 65C02 implements four additional opcodes that are very powerful and not found on the GTE version (I have not used NCR's version). These new opcodes allow you to reset (clear) and set bits in a zero page memory location and the branch if bit set (or reset) using these zero page memory locations. I find these instructions particularly useful for flags. One byte can be used for 8 separate flags. The GTE 65C02 will work on the][+ as well as the //e. The Rockwell version costs more than the GTE version.

Bob Sander-Cedarlof of S-C Software sells a 65C02 Cross Assembler for the Apple which is excellent. It allows one to write programs for the Rockwell, GTE and NCR 65C02's. Bob has also carried short briefs about the 65C02 in several issues of his APPLE ASSEMBLY LINE, another fine product of S-C Software.

About the only problem with using the 65C02 on an Apple that I have encountered is the inability to disassemble the new 65C02 opcodes with the Apple monitor's disassembler after you have written a program. I have written my own 65C02 disassembler and would be willing to make this available as a product if enough people were interested.

The 65C02 is a natural choice for use in mobile robots. At MICROMATION we chose this processor for our Robot Voice Recognition system which was kindly described by John Covington and Burt Webb in their article "HERO and APPLES". The 65C02 only draws 4 ma (at 1 MHz) compared to about 83 ma for the NMOS version. Additionally, the 65C02 will run at much lower speeds in applications not requiring high processing speeds. The power consumption drops off almost linearly with speed. So at 250 KHz it will draw only 1 ma. The NMOS 6502 cannot run below about 750 KHz because the internal registers are made of dynamic memory cells. This is tremendously important when only batteries are available for power. Our voice recognition computer, complete with 14K of CMOS RAM and 2K of CMOS ROM, serial I/O, amplifiers, decoders, etc. (all CMOS) draws only 45 ma.

John Covington and Burt Webb did a fine job with their article and I wish them the best with their book. I bought a HERO in January 1982 and was greatly disappointed to find that you could only enter programs with a 16 hexadecimal key pad. I designed an interface for my Apple and HERO to allow high speed data transfers using two 6522's. I tried to share this with other Apple/HERO users but made the mistake of sending the article to BYTE which sent me $50 and has now sat on the article for 15 months. Anyway, this did become a product of MICROMATION's (the MEMCOM - Memory and Communications board) mentioned by Covington and Webb.

My suggestion (plea?) for *Call -A.P.P.L.E.* is that you try to encourage more articles about hardware of the same fine quality as your articles on software. Within the last two to three years nearly all the personal computer magazines have shifted away from the hobbyist/experimenter to appeal to the high end user. Michael Thyng ("About Robots: An Account of Costs") made a fine contribution with his article but it would have been even more valuable with circuit diagrams, design notes, etc. The field of personal/hobbyist robotics needs this badly and so do the experimenters who have everything conceivable hooked to their Apples. As a professional designer, I know how valuable amateur designers are in a new field. Many enjoy creativity and innovation that is uninhibited by conventional design practices. These people can and do make valuable contributions in new fields (such as robotics).

Thank you.

Jack W. Lewis, President
Micromation, Inc.

Poor Man's Color Printing

I am looking for a program for my Apple][+.

Occasionally it is fun and even useful to be able to print a multi-colored picture on my monochrome Epson MX-80. I have a set of colored ribbons (red, blue, green, brown as well as black). In the past , when I've needed a multi-colored printout (for such things as display labels, bulletin board annoucements, graphs, etc.), I've had to go through the following tedious (but effective) procedure:

1. Position a sheet of paper in the printer with a registration mark so that the paper can be repositioned later to exactly the same place.
2. Load the desired picture onto the hi-res screen and, using a graphics editing program (such as Alpha Plot from Beagle Bros.), erase everything on the screen that is not red.
3. Remove the black ribbon from the printer and replace it with the red ribbon.
4. Using a screen dump program (such as Zoom Grafix from Phoenix Software) or a graphics interface card (such as a Grappler from Orange Micro), print the red portion of the picture.
5. Reload the original picture onto the hi-res screen.
6. Erase everything on the screen that is not green.
7. Remove the red ribbon; replace it with the green ribbon.
8. Reposition the paper exactly to the original registration mark.
9. Print the green portion of the picture.

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10. And so on until I've used all the colors or am satisfied with the result.

Surely there must be a better way! The program I am looking for would come back for another color selection until each color. in turn, has been printed. This program would eliminate the really time consuming chore (sometimes hours!) of manually erasing all but one color, pixel by pixel.

As an example: some time ago I was displaying a couple dozen model airplane engines of various types at a shopping mall show put on by my radio control flying club. Each engine was identified with a 2" x 4" label, printed on heavy, cream-colored paper. Each label had about six lines of descriptive text printed in blue and a decorative border printed in red. The labels were very effective, easy to do and received many favorable comments and interested questions.

Any information about a commercial source for such a program would surely be appreciated.

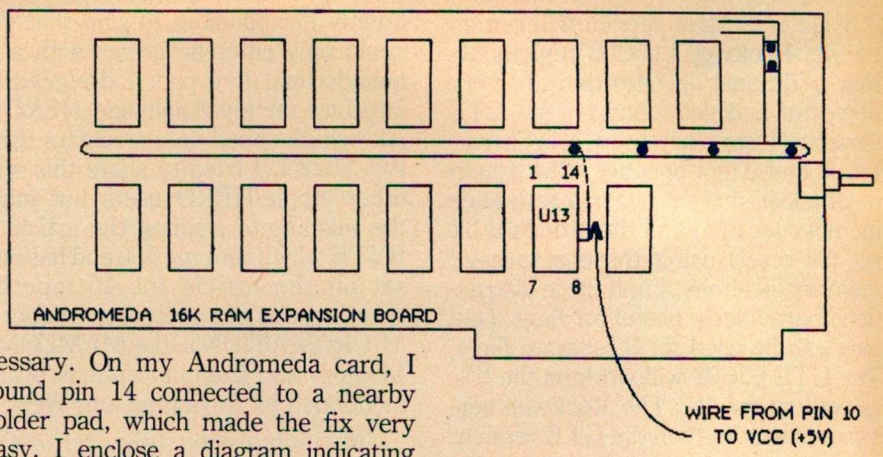
L.H. Axtell
433 Minnesota Ave.
Fallbrook, CA 92028

Andromeda Unstrained

In April *Call -A.P.P.L.E.* there was a letter from John Wallace regarding a problem that the Andromeda 16K memory extension card has if you try to switch it into write mode with a read from the soft switch location.

I want to report that I applied the fix that Wallace suggested and am now able for the first time to use an Andromeda card with my Lobo 8" floppy drive controller and Softcard CP/M. Apparently, Lobo's patches to CP/M for their floppy controller try to get the card enabled by reading it, and CP/M just hangs shortly after booting. Perhaps there are other frustrated Lobo-Andromeda users out there who will be happy to hear about this, and will want to make Wallace's fix themselves.

Incidentally, an engineer friend told me that I could achieve the desired effect on the Andromeda card by tying the free pin 10 of U13 to pin 14 (VCC) of the same chip. Low power Schottky (LS) logic apparently has diodes that make a separate pullup resistor unnecessary. On my Andromeda card, I found pin 14 connected to a nearby solder pad, which made the fix very easy. I enclose a diagram indicating what I did.



Robert H. Bernard

Computers and Education

This letter is in response to Lee Webster's excellent article, *A Conduit to Educational Software*, in your June 1984 issue. Education has been thought of as that form of social activity whereby, under the direction of mature minds, the intellectual, emotional, and physical powers of the immature are so developed as to prepare them for life. That may be how education has been idealized. The reality is far from this.

One of the inherent problems of the educational system is that, being conservative, it is very slow to change. Often by the time new ideas are implemented and reach the class room, they are deemed passe or ineffective. The school system is a dinosaur, and all of the well meaning people involved seem powerless to change the structure.

We continually promote a system which calls the mere conveying of facts "education." We reward those with the best memories as being the brightest. What we do *not* teach our children is how to be successful at life.

"Well," some might say, "that is why we place such a large emphasis on our sports programs—this teaches children how to be winners." No, this teaches children how to be competitive...how to block, tackle, and kick your way to the top. This does not make for a successful human being; rather, it teaches aggression. Aggressive people are the kind that wage war. We need assertive people—they get their needs met while respecting yours, which is hardly appropriate on the playing field.

The aim of Psychological Psoftware Corporation is to develop software that teaches one to be successful to the fullest extent of the word. Ultimately, success means happiness, and happiness is a thing that can be taught. One who is a winner at life has learned this lesson.

Let us take the matter of choosing values. Often teachers will impose their own value system on the pupil because it is something that they believe has validity. However, is this particular teacher a real winner? Even if the answer is yes, does the teacher understand those qualities which will make him a winner, and can he teach this to his students? It all becomes very subjective.

In our program, *On Becoming A Hero*, a great deal of effort was expended not to impose a particular value system upon the student. There are no "shoulds." There are no "shouldn'ts." Rather, the student measures his own input, not against accepted values, but rather in terms of whether his beliefs will truly make him a happy, creative human being. He is asked to look at his own heroes and examine the qualities which make them admirable. By such an analysis he is able to derive the qualities that he wants for himself. In the normal classroom situation, such things are not emphasized. It is more important to memorize the countries of South America; interesting, but not terribly useful. After all we must stick to the curriculum and the syllabus since it is a "dog eat dog" world out there! In such an educational system, how can our children hope to mature emotionally.

It is a pathetic fact that much educational software comes right out of the mentality of the antiquated little red school house. It is very dedicated to conveying facts and information, with little or no regard for the development of the person. Getting a 4.0 average may say a lot of things about a student and the adults who encouraged him to learn. Yet, have we only produced a brilliant failure? What kind of attention has been given to this student's emotional well-being? How does he really deal with anxiety, stress, fear, and depression?

Since the little red school house isn't about to change, it is our responsibility to use computer programs that teach our children to be winners. All of those wonderful creative ideas that new teachers have (before they are beaten down by the system) can now be turned into educational software that allows children to grow and blossom...and at their own pace. The computer is the perfect educational tool; the secret is in the software. It is true, the school system most probably will not radically change during our lifetime. Now with the advent of the home computer, that really may not matter.

Pax Nidorf, Ph.D.
Psychological Psoftware Corporation
4757 Sun Valley Rd.
Del Mar, CA 92014

Deciphered

I felt the need to write this letter as a warning to fellow *Call -A.P.P.L.E.* readers. Ralph Swerdlow's cipher described in "Telecommunications Security" (*Call -A.P.P.L.E.* March 1984) is easy to break. While sufficient to encipher minor items, the cipher is certainly not secure for any important messages. True, over 9.7 million different enciphering combinations exist, but cryptanalysis of the cipher does not rely on "brute force methods." Instead, Dr. Swerdlow's cipher turns out to be a periodic polyalphabetic substitution cipher, for which statistical methods of cryptanalysis are well known.

Consider the cipher. A message of N letters is broken up into groups by some modulus. That is, if the modulus is 10 (as in Swerdlow's article) there will be ten groups. Group 1 will consist of all the letter having a position in the series equal to 0 modulo 10 (i.e. letters #10, 20, 30 . . .). Group 2 will consist of letters whose position modulo 10 is equal to 1 (i.e. #'s 1, 11, 21, 31 . . .), and so on until Group 9, the position sequence (9, 19, 29, 39 . . .).

After breaking the message into groups as shown, the enciphering function is then to subtract a number k from the ASCII value of each letter. This operation results in 10 simple shift alphabets, which are notoriously easy to solve. For example, the normal frequency distribution of plain English is (in order of descending frequency) E, T, A, O, N, . . . J, Z. To solve any cipher group's shift, (say Group 1), we only need to find its frequency distribution, and "shift" it until it matches E, T, A, O, N . . . Suppose Group 1's frequency distribution is C, R, ?, M, L, . . . H, X. In this case:

C	R	?	M	L	...	H	X
+2	+2	+2	+2	+2		+2	+2
2	2	3	4	5		7	8
E	T	A	O	N		J	Z

And therefore, we know that the 1st, 11th, 21st, 31st, etc. letters of the plaintext were enciphered by subtracting 2 from each letter. We similarly continue this process for each modulus Group, determining the shift by matching its frequency distribution to that of normal English. Further, if as Swerdlow suggests, we subtract only numbers between 0 and 4 from each letter grouping, several groups will probably have the same "shift" key, making deciphering even easier.

Thus, Dr. Swerdlow's cipher may easily be broken by dividing the message into m groups (where m is the modulus number), and then determining the shift for each group. How can the cipher be strengthened? Here are two ideas:

1 — Increase the modulus number. This will provide fewer letters in each group, and hence a flatter frequency distribution.
2 — Instead of using a simple shift on each modulus group, permute the letters in a more random order. For example, instead of subtracting 2 from

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each plaintext letter, use random substitutions as below:

Group 1 plaintext: A B C D E F . . . Y Z
ciphertext: Q Z A P S V . . . B D

Group 2 plaintext: A B C D E F . . . Y Z
ciphertext: R C B K O W . . . E T

etc.

Finally, it should be noted that there are more advanced cryptanalytic techniques which will provide the modulus number m, so do not base any aspect of your message's security on it being kept a secret.

David August

Dear Editor

The encryption system Ralph Swerdlow describes in his March 1984 article "Telecommunications Security" is called a polyalphabetic substitution cipher. Security in the given example depends upon keeping the number of alphabets (10 in this case) and the statements in lines 120 to 210 secret. There are several ways of determining the number of alphabets. An easy way is to calculate the index of coincidence (IC). The polyalphabetic cipher smooths out the frequencies of normal English. Briefly, a low IC indicates more than one alphabet was used, and an IC near the normal .066 for English indicates a simple substitution cipher (or non-substitution method). If the encryption system repeats itself every tenth letter, then every tenth letter will be encrypted by a simple substitution cipher and the frequency charts for English will then apply. A computer makes it easy to compute the IC for one alphabet, the IC for each of two alphabets, the IC for each of three alphabets, and so on, until each of the individual alphabets have a high IC. For example, I encrypted the first two paragraphs of the article using Dr. Swerdlow's program. The IC for the encrypted text was .0390 indicating it was probably not a simple substitution cipher. For four alphabets I obtained .0339, .0439, .0370, and .0402 indicating that probably there were not four alphabets. For five alphabets I obtained values of .0554, .0674, .0706, .0682, nd .0560. These are close enough to normal English to suggest that five alphabets were used, and indeed, an examination of the program shows that the encryption system repeats after every fifth letter. Frequency charts made of every fifth letter exhibit the usual characteristics of normal English. The simple shifting of the normal alphabet (Caesar shift) makes it very easy to determine the substitution used. For a discussion of the IC (which is simple to compute) see *ELEMENTARY CRYPTANALYSIS: A Mathematical Approach*, by Abraham Sinkov. This book introduces some of the simple mathematical ideas used in cryptanalysis. It was written by a professional for high school students and laymen.

It is a mistake to believe that the expertise to solve these simple systems does not exist in the general public. Both computers and ciphers present interesting challenges so it is not surprising that many people are interested in both.

John Riegsecker

[Swerdlow's article was never intended to be more than a simple protection scheme, but it would defeat 90% or so of all "crashers." Even the most sophisticated methods, whether applied to disk protection or cryptoanalysis, are never completely secure.]

LETTERS POLICY

Call—A.P.P.L.E. welcomes letters from its readers on any topic relating to the magazine's content, A.P.P.L.E. services, experiences with hardware and software, current issues in computing, or programming notes. Because of space limitations not all letters can be selected for publication or printed in their entirety, but we try to present a representative sample of your views. If you would like your address published, please include it near your

Driving Straight

Here is a very short routine for resetting disk drive 1 after activity on drive 2. I use it in programs to ensure that I save any changes to disk 1. It can be embarrassing at the next boot, not to know where the latest program version is. Obviously, this has to be in native code, since turning on the language card turns off BASIC.

T. Stewart Harris

```
:ASM

                        1000 *--------------------------------
                        1010 *   DISK DRIVE SELECTOR
                        1020 * WHEN USING NEIL KONZEN'S
                        1030 * GPLE ON A LANGUAGE CARD
                        1040 *       MARCH 26, 1984
                        1050 *--------------------------------
                        1060         .OR $3C1  HIGH AS POSSIBLE
                        1070 *                 ON PAGE 3
                        1080 *--------------------------------
EA68-                   1090 DRIVE.POINTER  .EQ $EA68
                        1100 *--------------------------------
                        1110 * $3C1 == D691
03C1- A9 01             1120 START  LDA #1              DRIVE 1
03C3- 2C 83 C0          1130        BIT $C083
03C6- 2C 83 C0          1140        BIT $C083
03C9- 8D 68 EA          1150        STA DRIVE.POINTER
03CC- 2C 82 C0          1160        BIT $C082
03CF- 60                1170        RTS
                        1180 *--------------------------------
                        1190 LEN    .EQ *-START

000F-

0000 ERRORS IN ASSEMBLY
```

Even Better, Even Better Keypress

In the February issue, you printed a letter describing an Even Better KeyPress.

I tried to implement the code as given, and got a type clash message from the compiler on the line "pac: =0;," so I left a "help" message on the MUSUS (USUS, UCSD pSystem User's Group) board on CompuServe. The next morning there was a very helpful reply, which I repeat here, from Arley Dealey:

"The offending line needed to be pac[0] := CHR(0) ; The reference to Pac in the assignment statement must also be subscripted.
Several other notes . . . . . .
— the declaration of Pac could be:
Pac : PACKED ARRAY [0..29] OF Integer , which more accurately reflects its usage.
— Pac need not be initialized
— Control may be a constant
— therefore, this alternative version:

```
FUNCTION KeyPress :
BOOLEAN ;
VAR KeysAvail : PACKED
ARRAY [0..29] OF Integer;
BEGIN
    Write ( CHR (0) );
    Unitstatus( 1,
    KeysAvail[0], 1 ) ;
    KeyPress :=
    (KeysAvail[0] + + 0)
END ( KeyPress ) ;
```

I thought this had a nice elegance to it, and wanted to pass it on as yet an Even Better, Even Better KeyPress!

Bart Thomas
287 Gemini Dr. 4C
Somerville, NJ 08876

Dancing Apples

The articles on Apple music in *Call -A.P.P.L.E.*, June 1984, were a revelation of a little known aspect of our computer. I would like to bring our members' attention to what appears to be the only example of classical music evocative of apples: Morton Gould's delightful "Apple Waltzes," with each movement named for an apple variety including a Macintosh.

John C. Armstrong
RFD 1
Wolfeboro, NH 03894

PFS to CP/M?

I am writing on behalf of several individuals, including myself, who have been using PFS: File by Software Publishing and are now changing to a CP/M data base (InfoStar by MicroPro with the StarCard for the Apple computer). We are looking for a way that would allow us to access the data on the PFS: File data disk in one disk drive and write it on a CP/M disk in another drive. I have read and heard that there is a way to send information from one computer to another. If we connect two computers via serial cards and cable, could we have PFS printing out the data to the other computer which would receive the data using some modem utility? If so, which modem utility would you recommend? Or would it be easier to find a program that would allow us to read the data on the PFS: File data disk in one disk drive and write it to an Apple DOS disk in ASCII text in the other disk drive. (We could later transfer the ASCII text to the CP/M disk.) If anyone knows of such a program and could direct us to a contact person we would be grateful.

James M. Mol
26505 Margareta
Redford, MI 48240

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Clock Dating

Automatic date stamping of disk files is set up for 6 kinds of clocks or Hello manual date entry. New DATE command will auto-insert date in correspondence.

All times in seconds. (Time Test programs available)		DAVID DOS-II	ProDOS	DOS 3.3
TEXTFILES (100 Sectors)	TSAVE	8.0	NO	NO
	TLOAD	6.2	NO	NO
(791 Strings, 32 chars ea)	WRITE	29.3	28.0	88.4
	READ	24.3	16.3	83.8
	PRINT/READ	44.2	45.9	117.1
(442 Sectors, 7 x 500)	APPEND	142.3	142.9	1231.2
APPLESOFT (100 Sectors)	*SAVE	6.4	16.4	33.1
	LOAD	5.0	4.0	23.5
INTEGER (100 Sectors)	*SAVE	6.6	NO	33.4
	LOAD	4.9	NO	23.4
BINARY (100 Sectors)	*BSAVE	7.3	18.4	28.7
	BLOAD	5.8	4.8	24.5
48K PROGRAM SPACE (With 3 Bufs avail)	APPLESOFT	36,352	NO	36,352
	INTEGER	36,352	NO	36,352
	BINARY	36,352	34,816	36,352
64K PROGRAM SPACE (With 4 Bufs avail)	APPLESOFT	46,592	32,256	35,756
	INTEGER	46,592	NO	35,756
	BINARY	46,592	41,728	35,756

*Add 5 seconds for Verify. Apple II, Applesoft & ProDOS are trademarks of Apple

Ten New DOS Commands

1. HIDOS moves DOS above 48K memory.
2. FRE makes ultra-fast garbage collection.
3. DATE stamp files. Clock or manual dating.
4. TLOAD speed loads all Text Files to mem.
5. TSAVE speed saves Text Files from memory.
6. TLIST lists all Text Files to screen/printer.
7. DUMP Binary/Ascii to screen or printer.
8. DISA disassembles Binary to screen/printer.
9. AL prints program Address & Length.
10. / is a one keystroke Catalog.

Identical Operation

All new commands operate identical to old DOS commands on the keyboard & in programs.

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Two Word Processors for Home and School

Rick Sutcliffe

IN recent months we have begun to see more software of the work-a-day type packaged and marketed to the educational market. By this I do not mean instructional packages, markbooks, administrative materials, or even languages. Rather, what I want to discuss here are a few stripped-down versions of standard packages which seem to be of particular interest to schools.

Take word processors, for example. If a teacher is going to put one of these things into the hands of a student, it is going to have to be very easy to use, and that had better not just be advertising hype. I have tried to teach complex word processors like Screenwriter to high school students and found that only the most able could learn enough for any practical purpose. Wouldn't it be nice to have a simple one with only a few commands — suitable for typing short notes, letters and short essays? Wouldn't it be nice not to have to wade through a gigantic manual? Wouldn't it be nice to be able to teach one to an elementary school student and get useful work back?

Bank Street Writer $95
Scholastic Inc.
730 Broadway
New York, NY 10003
Copy protected—two backups provided

The education market version I tested came to me from Scholastic Inc. and, unlike the minimal commercial package, was complete with large format looseleaf manual and three copies of the (copy-protected) disk. The idea here is that more than one machine can be booted by a teacher, who can then change to a supervisory role while students make

buted to students. It consists of a nine page basic description which seems designed to take some of the beginner's anxiety out of the whole process. There are also some activity suggestions to assist teachers who have not done this sort of thing before.

Bank Street writer is an example of a low budget word processor which is at once very simple to learn, but suitable only for relatively small tasks.

Ease of use is accomplished by keeping a simple menu on the screen at all times. Typing [ESC] will revert to a previous menu in the hierarchy, and it seems difficult for even the most determined user to crash the system.

There is an adequate, but limited, supply of text editing commands and a very limited capacity to format the printed document. There is no way to change the default print formats such as margins on the fly. Serious writers could not live with the limitations of this software, but for students it may well be ideal. For what it attempts to do, this package rates an A. However, in serious competition with full-fledged word processors it could only be given a C.

What we have here is a good, fast, utility for small writing tasks and a top quality introductory program for students. At the price, it is a real good buy.

HomeWord $70
Sierra-On-Line
36575 Mudge Ranch Road
Coarsegold, CA 93614
Copy protected—backup $10

New from the same company that brought us Screenwriter (Sierra On-Line) is a second contender for the low price home and educational market. For under $70, you get a somewhat stripped down word processor which retains the key features everyone must have, while making an attempt to add some unique ones of its own.

Chief among these are the icons for many of the menu choices at the various command levels. The bottom of the high resolution screen upon which the working area is located has a series of pictures and an outline box which can be moved by the arrow keys to frame one of them. When [RETURN] is pressed, the framed function is executed. This makes Homeword very easy to learn, though it would be a pain to continue reliance on the editing icons without eventually learning their keyboard equivalents, as the latter are much faster to operate.

Down at the bottom of the screen is a small line diagram of the finished version of the present page being worked on in all its formatted glory. This little wonder is updated every time you stop typing long enough to let it do its thing. If the document is lengthy, this can take forever — I assume that it goes through the whole process from the start each time; obviously this package is intended only for writing shorties.

We do get such standard features as full cursor control, cut and paste operations, reformatting margins, boldfacing and underlining on the fly (the latter is dependent on printer card and printer type) and the ability to merge files into an existing document or include them at runoff time.

The bottom line on HomeWord is an A for dollar value, an A in innovativeness, and a B as a word processor (competing head on with the best). This one is a must buy — one of the best pieces of software of any kind I have yet seen. Owners of other computers need not feel left out; versions are available or in the making for several.

Relocatable Assembly Language

Neil Bronstein

THIS is an Applesoft Program which imbeds a Relocatable Assembly Language Program at the end of a BASIC Program using the Transparent Method of Appending. This method loads a BASIC program, loads an assembly language program at the end of the BASIC program and then moves the end of program pointer to the end of the appended program. The assembly language program is entered by calling the end of program pointer minus the length of the assembly language program. The BASIC program may be changed at any time without losing or changing any of the assembly language routine. Be sure, however, that the routine is relocatable!!

I have seen several similar programs, in fact identical in function, using assembly language to achieve this end, but I thought it would be interesting and informative to do it in BASIC.

How It Works:

Lines 30–50 ask for the names of the BASIC program, the assembly language program which is to be appended to it,and the new name of the final program. Line 60 deletes any previously saved file named ELA (Exec Language Append). Lines 70–190 print statements into a text file, ELA, which when EXEC'd, will execute commands as though they were keyed in from the keyboard.

Some Specifics:

Notice that variables are used to define some of the pointers. Applesoft stores simple pointers just above the end of the BASIC program. Since we are loading an assembly language into that space, the variables will be written over. I, therefore, moved LOMEM arbitrarily to 36000, which is high enough to not interfere with most programs.

The end of program pointer, EN, is extended by adding to it the length of the assembly language program, BLN, and naming it NWLN. The NWLN address is POKEd into the

```
UTILITY TO ATTACH ASSEMBLY
PROGRAMS TO BASIC PROGRAMS

     BY NEIL BRONSTEIN


15  HOME :D$ =  CHR$ (4)
20  PRINT  CHR$ (4)"MONI,O,C
30  INPUT "ENTER NAME OF BASIC PR
    OG... ";P$
40  PRINT : PRINT : INPUT "ENTER
    NAME OF BINARY PROG... ";B$
50  PRINT : PRINT : INPUT "ENTER
    NAME OF APPENDED PROG... ";F
    $
60  PRINT D$"OPEN ELA": PRINT D$"
    DELETE ELA": PRINT D$"OPEN E
    LA": PRINT D$"WRITE ELA
70  PRINT "PRINT CHR$(4)"; CHR$ (
    34);"LOAD ";P$
80  PRINT "LOMEM:36000
90  PRINT "EN=PEEK(175)+256*PEEK(
    176)": REM   END OF BASIC PR
    OGRAM
100 PRINT "PRINT CHR$(4)"; CHR$
    (34);"BLOAD ";B$;",A"; CHR$
    (34);";EN
110 PRINT "BLN=PEEK(43616)+256*P
    EEK(43617)": REM   LENGTH OF
     LAST LOADED BINARY PROG
120 PRINT "NWLN=EN+BLN": REM   P
    OINTER TO END OF APPENDED PR
    OGRAMS
130 PRINT "POKE176, INT(NWLN/256
    )
140 PRINT "POKE175,(NWLN/256-INT
    (NWLN/256))*256
150 PRINT "POKE104,INT(2049/256)
    ": REM   RESET LOMEM TO STAR
    T OF PROG
160 PRINT "POKE103,(2049/256-INT
    (2049/256))*256
170 PRINT "SAVE ";F$
180 PRINT D$"CLOSE
190 PRINT D$"EXEC ELA
```

f program pointer address in
30 and 140. In lines 150 and
XTAB (start of program point-
eturned to its original value of
al 2049.

ne 170 saves the program under
name specified in line 50. The
iles are closed and the newly created text file, ELA, is EXEC'd.

The following listing is the actual creation of an ELA text file named "NEW SPEED SORT PROG," appends an assembly language program named "SPEED SORT" and saves the appended program under the name "ASSP." Finally, the EXEC'ing of the file is printed.

Ultima III

(Continued from page 19)

Table 1

Player Storage Track 03

Character (in party)	Sector	Description
1 Bob 2 Ted 3 Joe 4 Mike	7	Party Sector
(in roster)		
1 Mike * 2 Sue 3 Ted * 4 Eliminator etc.	8	Player Storage Sectors
	9	
	10	
	11	
17 Mephisto 18 Joe * 19 Bob * 20 Fred	12	

When working with all 20 players, you must disperse the party which then, figuratively, puts the four party members back into the roster (and also saves their statistics to the player storage tracks). Then changes are made to the players through the storage tracks. When the party is formed again, these changes are "brought with" them and you resume as normal. However, if you forget to disband and make the changes anyway, you will find that your changes do not appear. This is because they were saved to the storage tracks, not the party track. Therefore, if the modifications listed are made, the changes will be recorded directly to the party track and you won't have to worry about disbanding or [illegible] again.

Backdoor Wizardry

(Continued from page 15)

goodies the character you will be using for the transfer has to another character (he will be overwritten in the process). Boot (No.2) and transfer whatever gold and equipment you wish to duplicate to him in the tavern. Remove all other characters from the party leaving only the one to be transferred.

Now remove the (No.2) scenario disk from the drive and place it with (No.1). LEAVE THE GAME! The loaded characters will be sent to the disk. (If you should reboot (No.2) this character will be listed as out. It will be necessary to recover him before using it again.) DO NOT START A GAME by adding your good characters to the one you just transferred to complete the party! Everything is in memory from the previous activity and the machine thinks you are using the characters of No.2 who gave their goodies away. By the time you discover this during an inspection, it will be too late. If you leave the game you will have the depleted characters on your disk, and if you simply cut it off, you will have everyone out! You can recover and start over, but why waste the time?

Remember "Knowledge is power!," so...

ADVENTURE, CONQUER,
LEARN, & ENJOY!!!

Related Articles

1) Lantz, Kerry J., "Wizfix," *InCider*, Aug.,'83 p.60
2) Ude, Art, "Wizardry – How to Beat It," *Call –A.P.P.L.E.*, Aug., '83 p.43
3) Williams, Christopher H., "Out–Wizarding Wizardry," *Call –A.P.P.L.E.*, Dec. '83 p. 61

IIe 80 Column Card

(Continued from page 61)

regard to the use of NORMAL, INVERSE, and FLASH in BASIC.

In the old 40 column mode, recall that the card is inactive. No quirks appear when upper case letters are used, i.e., NORMAL, INVERSE, and FLASH behave themselves. If FLASH or INVERSE is in effect, lower case letters can not be used. For example in either case, a lower case j will appear as an * on the screen.

In the new 40 column mode or 80 column mode recall that the card is active. Now FLASH is not allowed for either upper or lower case letters. In fact, things like the question mark appear as a checkerboard, and space appears as an accent mark. Only INVERSE and NORMAL are allowed. If you are one who likes dark characters on a light background, activate the card, invoke INVERSE, then use HOME to clear the screen. Until you switch to NORMAL, the screen will be dark characters on a light background.

Another quirk to avoid is the use of PR#0 to deactivate the card. It should only be deactivated by means of ESC [Ctrl–Q] because PR#0 locks up the cursor and creates some strange results. As another article of mine shows, there is a minor change that can be made to DOS to allow the use of PR#0 to deactivate the card.

Ups and Downs

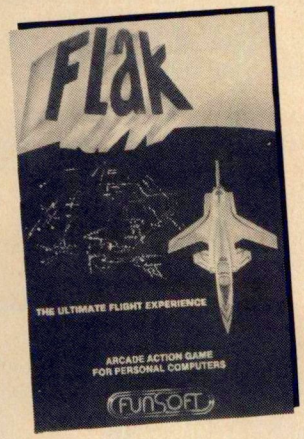
You should also be careful about using the CAPS LOCK key. Leaving it up allows lower case letters to be entered. This is great for input under program control but it blows DOS's mind when you try to enter lower case commands. With the old 40 column mode active there is no way around this problem.

With the card active, there is a simple solution to this problem. Enter ESC R, with the result that lower case letters keyed in will be converted to upper case and DOS is happy as a lark. Not only that, entering a BASIC program will also cause things like print to be converted to PRINT. The card is even smart enough to recognize that a string delimited by a double quotation mark must be handled differently. In other words, when the card detects a ", lower case letters are not converted to upper case. This remains in effect until another " is encountered, at which time, lower case letters will be converted to upper case.

Entry of ESC T turns this feature off, i.e., it cancels the ESC R. If you switch back to the old 40 column mode, ESC R is no longer available. In fact, if you then activate the card again you must enter ESC R to convert lower case to upper case even if this was in effect when you switched back to the old 40 column mode.

THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E. Watch for evaluative reviews in *Call — A.P.P.L.E.*.



LOOK OUT FOR FLAK

The year is 2096 and the universe is threatened by *Computer Control*, a sinister force attempting to eliminate all existing freedom. Your mission as a pilot-warrior is to attack and destroy this menace. You'll fly in low over awe-inspiring scenery which just might be your end. Guarding the approach to *Computer Control*'s fortress is an array of intelligent flak batteries. Their deadly fire comes from all directions and can only be countered by your maneuverability and air-to-ground cannon.

FLAK offers maximum playability and challenge. The flight experience covers up to 28 continuous game screens. Play options and features include: choose the level of play (normal or expert), the number of players (1 or 2), and have the high scores saved to the game disk. Soon after take-off, the player finds himself in the thick of it. The flak batteries are ruthless as they even try to shoot him in the back and team up to produce multiple cross-fires. Survival requires a steady hand on the flight stick and a quick finger on the fire button.

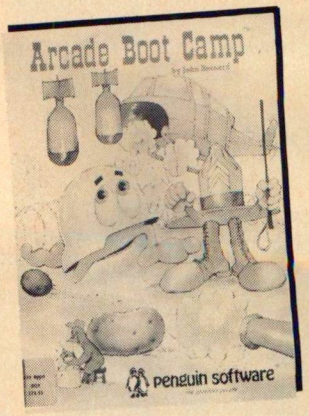
INTERACTIVE SCIENCE FICTION GAMES

Cambridge, MA — A series of interactive computer adventure games based on novels by best-selling science-fiction authors was announced today by Trillium Corp.—a new division of Spinnaker Software Corp. Inspired by the novels of such authors as Arthur C. Clarke, Robert Heinlein and Michael Crichton, the games are narrative-based adventures to other times and places.

Six Trillium titles will be released late this summer: *Rendevous with Rama*, based on the book by Arthur C. Clarke; *Amazon*, by Michael Crichton; *Dragonworld*, based on the book by Byron Preiss and Michael Reaves; *Starman Jones* from the book by Robert Heinlein; *Fahrenheit 451* based on the book by Ray Bradbury; and *Shadowkeep*, from which a book has been adapted by Alan Dean Foster.

They all feature professionally written scripts and high-resolution full-color graphics. The games understand hundreds of English words, so players can type sentences in natural language. The plot-based games have graphic clues and hints and a large number of locations and situations.

Price and Availability—*Dragonworld, Amazon, Shadowkeep,* and *Rendezvous with Rama* will be available in August. *Fahrenheit 451* will be released in September and *Starman Jones* in October. They are each priced at $49 and all run on the Apple *IIe* and *IIc*. *Spinnaker Software, 1 Kendall Square, Cambridge, MA 02139.*



ARCADE BOOT CAMP

Suck in that gut, tuck in your chin, and march over to the recruiting station. It's time to enlist in the Arcade Army!

If you're tired of getting 30 seconds worth of frustration for each quarter you feed into a video game, a few weeks in Arcade Boot Camp will make a game player out of you. So wipe that silly smile off your face and listen up, soldier.

The purpose of your training is to work your way up from lowly Private to Sergeant Major. The Drill Instructor will be there to motivate you recruits to learn how to run, jump, and shoot; become an ace chopper pilot; master the skills of the road and put it all together like a real arcade hero.

Learn how to drive your jeep through oncoming road markers, then tr doing it in icy winter road conditions. When you get good at that, you'r ready for K.P. duty—but first you have to chase the spuds through a maz

Go for speed in the target practice section. First try the static target then pop-up targets, moving tanks, and fast-flying birds. Got that dow

Fly the chopper to collect all the cargo boxes in order. As you pr gress, the boxes are in places which are more difficult to maneuver Then you'll find the added challenge of avoiding the cannonballs. Be not run out of fuel, soldier.

Tired yet? Better not be. You're just getting started. You'll need to what you've learned to the test in Survival Training. Hope you surv soldier.

Available on Apple disk from Penguin Software. Retail price: $2

AMAZON EXPEDITION DEPARTS FOR KA

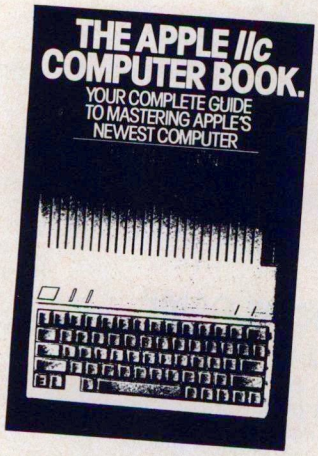
You first heard of Professor Arrowhead at the 'Dillo Diner in Nihil, Texas. The waitress there said he was looking for some crazy to go into the jungle. You just happen to have been waiting for the chance to try out your pith helmet and khakis you got for your birthday from Aunt Gertrude, and a trip to find the lost city of Ka sounded like just what you had in mind.

Expedition Amazon is a fantasy role–playing game in which you lead your expedition deep into the Amazon rain forest to find the ruins of a fabled Inca citadel which is rumored to hold a great secret in its underground tunnels. You command a party of four specialists and they will grow in strength and stamina—if they survive.

Dozens of high–resolution screens and nine levels of difficulty make the game challenging, enjoyable and promise many hours of entertainment. Move over, Indiana Jones!!

Retail price: $34.95. *Penguin Software, P.O. Box 311, Geneva, IL 60134.*

APPLE *IIc* BOOK



The Apple IIc Book, a complete guide to Apple Computer's new personal computer, was written for new Apple *IIc* computer buyers and experienced Apple users. This book provides tips and information unavailable from any source, including the owner's manual. It answers users' questions about compatibility and helps them configure their new system, and includes information on DOS 3.3 and the newly developed ProDOS.

The Apple IIc Book takes the readers on an external tour of all hardware elements of the Apple *IIc* and includes instructions on connecting modems, monitors and printers. In addition, the book reviews the essentials of Applesoft BASIC commands and logic users need to program the Apple *IIc*, plus provides extensive information on graphics programming.

Special features of the book include information on adding peripherals such as mice, touchpads, graphics tablets, and the new "flat screen," honest appraisals of leading and lesser–known recreational, business, educational and utility software packages, care and maintenance, troubleshooting, accessing bulleting boards and locating user support groups. Published by Bantam Books. $12.95.

EINSTEIN'S BEGINNERS' GUIDE TO THE APPLE *IIc*

San Diego, CA — Einstein's Beginners' Guide to the Apple *IIc* introduces new owners to computing to help get their computers up and running right away.

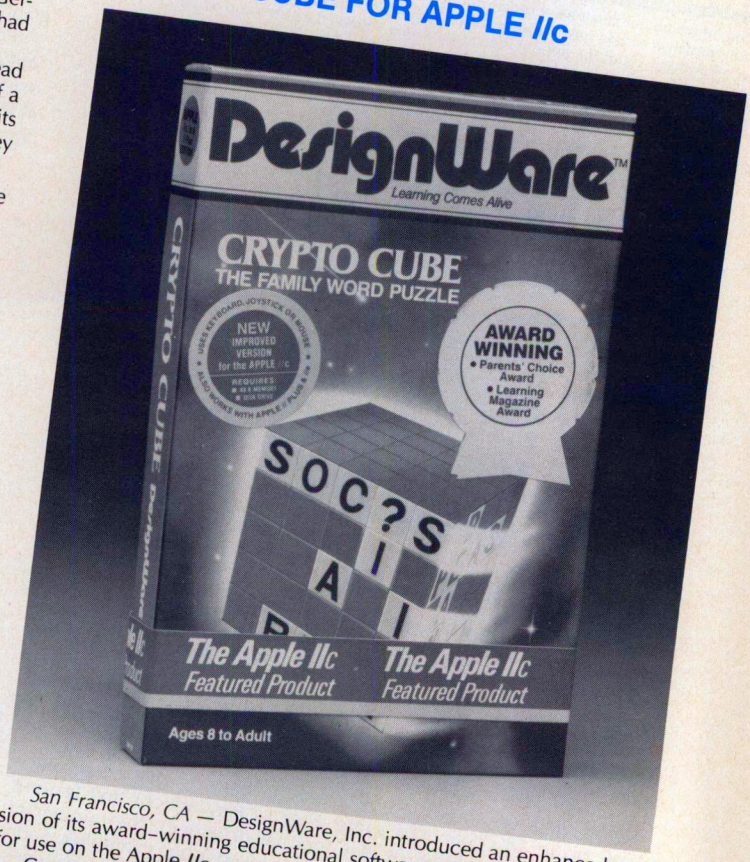
The book, approximately 150 pages long, will serve as a supplement to the four tutorial disks included with the Apple *IIc*. LOGO, BASIC programming, AppleWorks and MousePaint programs all will be explained and samples will be given.

Einstein's Guide will also feature model programs to teach new Apple *IIc* owners how to program their own computer. All programs are explained line by line in simple English, not computerese.

The book, according to Editor Chuck Arthur, requires no prior computer or programming experience. It is meant to be an entertaining and informative introduction to computing for beginners.

Einstein's Beginners' Guide to the Apple *IIc*, published by Harcourt Brace Jovanovich, will be available at bookstores and computer stores nationwide for $7.95.

CRYPTO CUBE FOR APPLE *IIc*



San Francisco, CA — DesignWare, Inc. introduced an enhanced version of its award–winning educational software program, Crypto Cube, for use on the Apple *IIc*.

Crypto Cube for the Apple *IIc* was designed to take advantage of the machine's double high resolution graphics and user–interface options—keyboard, joystick and AppleMouse *IIc*.

Designed for one or two players, Crypto Cube is a three dimensional word puzzle that builds vocabulary skills for ages 8 to adult. Each side of the cube features a crossword puzzle–like grid containing squares with words hidden behind them. Players win points by correctly guessing which letter is hidden behind each square.

Prior to the start of each game, players select one of the 50 word lists included on the Crypto Cube Disk, or create a puzzle from their own word lists. Puzzle topics range from "Animals," "Vegetables" and "Months and Days" to "Computers," "Constellations" and "Chemistry."

Each puzzle contains a list of 20 words that vary in length and difficulty. After players choose a topic they are given the option of viewing the word list before play begins. They also can call up the list of words at any point during the game.

All DesignWare programs currently are available for all Apple computers — including the Apple *IIc* — for a suggested retail price of $39.95.

APPLE *IIc* CONSUMER SUPERBUNDLE: BUY DOLLARS AND SENSE / BANK STREET WRITER, SAVE ON A MOUSE

San Francisco, CA — Monogram and Broderbund Software, Inc., producers of two home productivity software programs. Dollars and Sense and Bank Street Writer, announced a joint promotion for consumers offering new Apple *IIc* versions of the packages in a bundle that includes a discount coupon for an Apple mouse.

Available in limited quantities, the joint package retails for $189.90. The coupon, which is redeemable this summer, allows the consumer to buy the mouse for $44.95, a significant savings over the currently available Apple mouse.

Three major changes have been made in the original Dollars and Sense program to take full advantage of the Apple *IIc*'s features. The user interface of Dollars and Sense was greatly enhanced for use with the mouse; two levels of detailed help screens were incorporated throughout the program; and Dollars and Sense was improved to make the use of a single disk drive much more comfortable for users.

In addition to the new Apple *IIc* version, Dollars and Sense is available on the Apple II, II+ and *IIe*, and will soon be available for the Macintosh.

The Apple *IIc* version of Bank Street Writer offers AppleMouse control, full cursor movement while writing, a new tab capability, display of and control over page breaks, and a copy function. Users can also set up a library of printer commands and embed them in the text for more control over the appearance of final copy.

In addition to the new *IIc* version, Bank Street Writer is available for the Apple II, II+ and *IIe*.

Both Dollars and Sense and Bank Street Writer utilize the Apple *IIc*'s 128K memory and provide the user a choice of 40 or 80 column display.

Both programs can also be run on the 128K Apple *IIe* by using an extended 80 column card.

For more information on the bundle, contact *Derek McLeish, Vice President of Sales and Marketing, Tronix Publishing, Inc., 8295 S. La Cienega Blvd., Inglewood, CA 90301 (213) 215-0529* or *Cathy Carlston, Director of Marketing, Broderbund Software, Inc., 17 Paul Drive, San Rafael, Calif. 94903. (415) 479-1170.*

THE COMPUTING TEACHER

Journal of The International Council for Computers in Education

- Computers in Elementary Education
- Computers in Junior High School
- Computers in High School
- Computers in Teacher Education

The Computing Teacher, published nine times a year, August-May, is a journal for precollege educators who are making instructional use of computers or who are concerned with how computers are affecting the content and process of education. Each issue contains information of use to the beginner as well as to the more experienced computer user. TCT features articles, software reviews, book reviews, film reviews and special columns, including Computers in the Teaching of English, The Logo Center, Computers in Science Education and Computers in the Arts and Humanities.

The Computing Teacher is the journal of The International Council for Computers in Education, a non-profit, tax-exempt professional organization. ICCE has members from every state in the United States, six Canadian provinces, and from over 60 other countries. ICCE is dedicated to helping teachers learn about computers in education and to improving education at all levels.

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Back issues of all copies of The Computing Teacher are available. Write or call ICCE (503) 686-4414 for a current price list.

Circle 37 on Reader Service Card

A.P.P.L.E. and MicroPro announce the great Apple CP/M board giveaway.

$325.00

Product Code	SPWORD
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ug. Retail	$495.00
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Get a FREE StarCard CP/M Board worth $375
when you buy MicroPro's Wordstar,® WordStar Professional™ or Infostar.™

MicroPro's determined to make every Apple a Star.

So now when you buy the best-selling WordStar, WordStar Professional or InfoStar for your Apple II, II+, or IIe computer, you receive FREE a StarCard CP/M board worth $375.

StarCard lets you take full advantage of the advanced, yet easy-to-use features of MicroPro software. Plus, you can run thousands of other CP/M based programs at a processing speed significantly higher than that of Apple programs.

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StarCard Features at a Glance:

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* CP/M Operating System, Version 2.2
* Supports popular Apple compatible 80-column boards, floppy and hard disk drives, and printers

A.P.P.L.E. STARCARD™ MicroPro®

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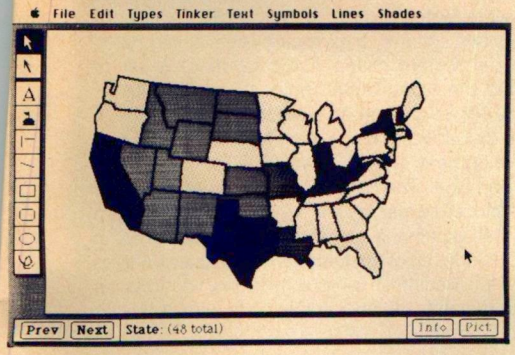
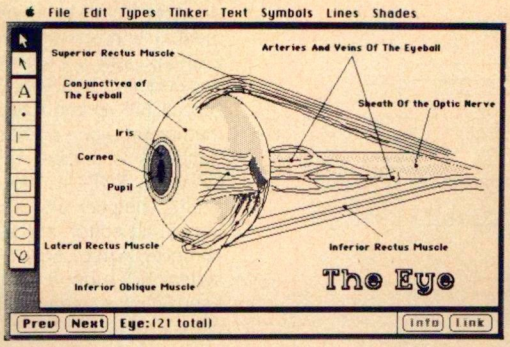
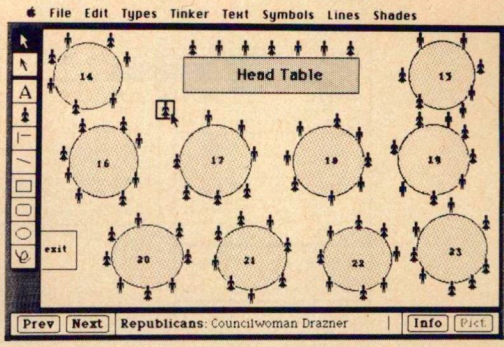
VISUAL FILING SOFTWARE FOR MACINTOSH



Map out sales territories. Sift out subdivisions for direct-mailings. Or search out the states that participated in the French and Indians Wars. Filevision makes your requests pop off the screen. In the click of a mouse.



Create technical illustrations or pictures of science class projects, with ease. Whatever you need to remember about your picture, Filevision lets you store on forms connected to it.



Plan a political fund-raiser with Filevision, and seat the non-smoking Independents away from the smoking Republicans. Or, click to see which blocks of seats have been reserved at your dinner theater.

Santa Monica, CA — A new software package for the Macintosh combines the practicality of a filing system with an object-oriented drawing system. Filevision was developed by Telos Software Products and allows the user to manipulate and organize data with ease. For instance, if the user wants to highlight an object with shading or outlining, a pull-down menu provides that choice.

As one example of Filevision's many applications, a sales manger could easily draw a map of the United States and store individual sales records and locations of the salesmen in his department. Without any additional programming, this manager could then identify the top producers in his department by state or region. These inquiries could then get more specific depending on the manager's needs and the availability of information—again, without additional programming.

Another example of the use of Filevision involves planning the seating arrangements for a dinner party, and more specifically, where vegetarians are seated, if smokers and non-smokers are separated and whether single and married people are seated at different tables.

Because of the varied applications of Filevision, the user is in a dynamic environment where subjects can be visualized and data files created almost as quickly as the user can think of them and click the mouse.

Filevision will be available on August 15 at a suggested retail price of $195.00. *Telos Corporation, 3420 Ocean Park Boulevard, Santa Monica, CA.*

AN EYE FOR MAC

An imaging peripheral that allows the Macintosh to take pictures. Featuring easy-to-use pull-down menus, the user can print a picture or save to disk. Several features for image enhancement are built right into the program. Pictures created with the MicronEye software are fully compatible with MacPaint, allowing a full range of customizing capabilities. The MicronEye is a complete plug-and-go system including tripod, lens, hardware, software and user's guide. Available for immediate delivery. List Price: $395.

Micron Technology, Inc., Visions Systems Group, 2805 E. Colombia Rd., Boise, ID 83706, (208) 383-4106.

NEW "HOME ACCOUNTANT" FOR APPLE'S MACINTOSH & *IIc*

Los Angeles, CA. — Arrays, Inc./Continental Software will ship two completely rewritten versions of its *The Home Accountant* for Macintosh and *IIc* in early summer.

Shipments of *The Home 'Mac' Accountant* will begin in July. Designed for optimum utilization of the Macintosh's capabilities, *The Home 'Mac' Accountant* provides several new features not contained on the original program. It enables users to take advantage of the Macintosh's "on-screen calculator," can support 3000 total transactions on one disk, and be programmed to make up to 50 automatic transactions each month. Suggested retail is $99.95.

Arrays, Inc./Continental Software also is offering an expanded version of *The Home Accountant* specifically re-developed for the Apple *IIc*. The new program may be used with the 128K *IIe* system. Key new features include 80-column capability, ProDOS format for much faster operation, use of the mouse, on-screen display of reports, and an appointments/memos calendar with bill paying reminder and other helpful functions. This expanded new version of *The Home Accountant* carries a suggested retail of $74.95.

What's the difference between an —INCH— *and a*

MacInch

Only about 1/16th of an inch. But a 6 inch horizontal line on the *MacPaint*™ screen will print 3/8th's of an inch longer than you expect. If your scale is 1" = 100' your drawing is off 37.5 feet.

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Order now and receive free the **"Quick Rule" MacInch**™ ruler with your order. Measures normal and Fat Bit Screens.

For prompt delivery of your normal screen and Fat Bit screen, two dimensional rulers and your **FREE "Quick Rule" MacInch**™ ruler, mail $9.95 check or money order to:

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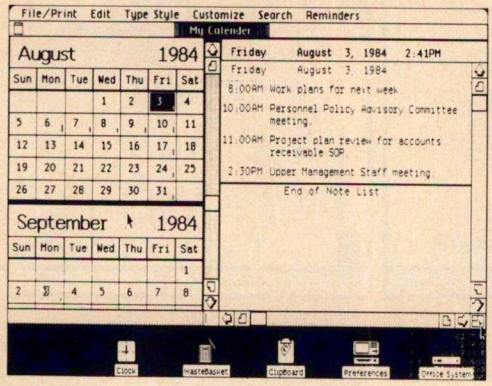
Circle 31 on Reader Service Card

VIDEX PRODUCTS FOR MACINTOSH AND LISA 2



Videx is introducing software for the Apple Supermicros, Lisa 2 and Macintosh.

DESKTOP CALENDAR combines a calendar with a notepad, appointment book, and tickler file. A glance at the calendar shows which dates have important items requiring attention. By combining a notepad and appointment book, DESKTOP CALENDAR integrates your daily schedules and important events with the Lisa Office System. With the tickler file, you designate which notes you want to be reminded of later and DESKTOP CALENDAR will interrupt you with a reminder at the proper time, even if you are using another program.

For the Macintosh, Videx offers a variety of entertainment and business software with more products due to be released in 1984. Call *Videx at (503) 758-0521* for more information on Macintosh software and DESKTOP CALENDAR.

FONTS FOR THE MACINTOSH

ART DECO
Wall Street
CIRCUS
Palo Alto
Centura

Font Creations introduces five new fonts for the Macintosh. The selection of fonts includes both business-oriented and decorative typefaces and each font is provided in a variety of point sizes.

The new Fonts, **Wall Street**, **Centura**, **Art Deco**, **Circus**, and **Palo Alto** are installed using the Font Mover application, which is included with each Macintosh. Once they are installed and in the system, these new fonts can be used in any application that allows a choice of fonts, such as MacWrite or MacPaint. Price: $29.95. Font Creations, P.O. Box 36, [illegible] MA 01164.

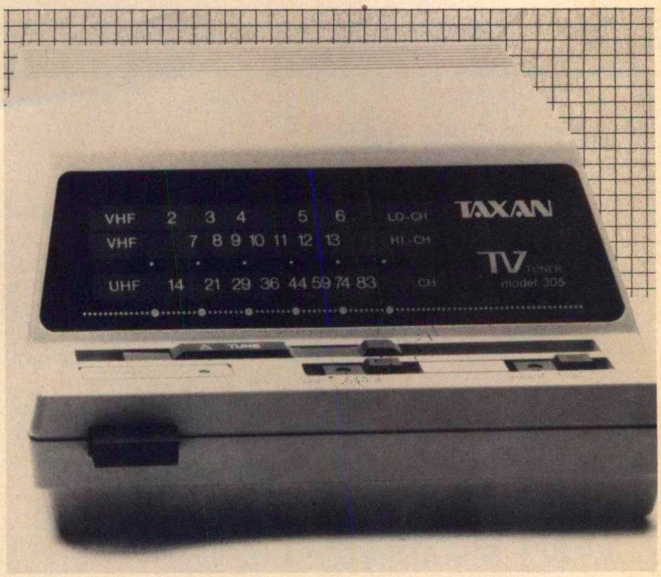
C COMPILER FOR MACINTOSH

A C compiler software development system for the Macintosh is now available from Manx Software Systems, Inc. The Macintosh C development system is available as two systems, a personal system called Aztec C68K-p, and a commercial system called Aztec C68K-c. A set of development utilities called the Axtec C68K Toolbox is also available. Aztec C68K-p and Aztec C68K-c will run on a Macintosh with 128k of memory and one or more disk drives. The development software is also available as a cross development system from PC DOS, MS DOS, CP/M-86, PDP-11, VAX, and LISA. The Aztec C68K-p system consists of a full C compiler, a 68000 relocating macro assembler, a full UNIX system library, an editor, and a shell command environment. The commercial compiler, Aztec C68K-c, includes all of the features of the Aztec C68K-p system plus support for the full Macintosh toolbox including windows, an overlay linkage editor, and dynamically relocatable code with unlimited code size.

The code size and execution speeds for the Manx Aztec Macintosh C Compiler outperform any native development system currently available for the Macintosh. The sophisticated supporting routines and utilities of the commercial system provide a powerful and flexible tool for producing software for the Macintosh.

Prices start at $199 for the personal C development system. For detailed information and pricing contact *Manx Software Systems, Inc. Box 55, Shrewsbury, NJ 07701. 1-800-221-0440 (outside), 201-780-4001 (NJ).*

TUNER TURNS MONITORS INTO TELEVISIONS



TAXAN Corporation announces its new model 305 television tuner. The tuner enables anyone using any brand of composite monitor with audio, to convert their monitor to a color television for $129.95 retail.

Because of the higher CRT quality in monitors over televisions, the monitor-turned-television has a much clearer picture than most regular televisions. For further information, contact: *TAXAN Corporation, 18005 Cortney Court, City of Industry, CA 91748, (818) 810-1291.*

COMPUTER GENEALOGY JOURNAL

RaeData, Inc. announces its new bi-monthly publication, Micro-ROOTS. The Newsletter/Journal is written for any micro computer user who is interested in family roots/history, as well as the serious genealogist.

The first issue is scheduled to contain articles on: Getting Started with your Family Roots; Genealogical Software Reviews; User Group activities; Search for Family Roots; Reviews of Genealogical self-help books; Archival Research Techniques; A Query Column; Calendar of Genealogical Society events; and many other features.

Future issues are expected to continue these features, with additional articles and columns of interest to the home micro computer family historian. A bulletin board service and a genealogical/family roots forwarding service are also planned.

Subscriptions are $24.95 per year and may be sent to: *Micro-ROOTS, 14208 Weeping Willow Drive, Suite 32, Wheaton, MD 20906.*

LOCK-IT-UP

Double-Gold has introduced Lock-It-Up diskette copy-protection systems for the Apple II and Macintosh computers. These systems are menu-driven and allow the implementation of several levels of security which render standard diskettes virtually uncopyable by even the most sophisticated of pirating methods, including the use of advanced nibble copy programs.

The protection is based upon an encrypted signature track which is written to a random location on the diskette. Protection code which verifies the accuracy and existence of this signature track is automatically encrypted into the programs to be protected. Lock-It-Up also implements special modifications to the operating system which increase the level of data security. Protected files may be backed-up by the user, although they will only operate if they reside on the original diskette. Since the protection is not based upon a physical "fingerprint," complete write-protection of the information is possible. The protection will not interfere in any way with the normal operation of the software which is protected.

Licensing of Double-Gold's protection systems begins at $495. *Double-Gold Software, Inc., 3900 Moorpark Ave., Suite 29, San Jose CA 95117 (408) 554-9913.*

TID BIT SOFTWARE PRESENTS THE "MASTER SERIES".

A series of comprehensive software systems giving professional capabilities to personal computers.

Graphicmaster is a Visual Presentation System which contains a powerful Graphic & (ampersand) Language with a menu-controlled set of utility programs. Its purpose is to simplify adding text and animation to your graphics for use in visual presentations.

Graphicmaster contains a complete Font developing system, a very flexible Animation module, a Color/pattern backdrop generator, and a Window definition module. Included in the system is a Graphic Ampersand Language with over twenty-six commands to link graphic elements to your own programs giving you complete control of Apple hi-res graphics.

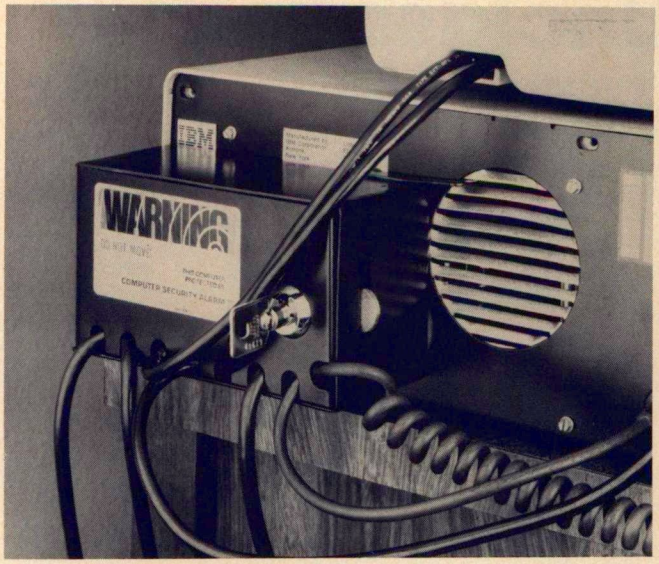
The package contains a 45 page manual that explains the steps necessary to make your presentations come alive while teaching you about different animation types, text generation, and color handling on the Apple. The manual also contains memory management information including charts and program examples to get you started. System Requirements: 48K, Applesoft, DOS 3.3 and one disk drive. Price: $79.95

Micro/Typographer is a single-disk system that can be used to effectively title new or existing high-resolution graphic images. It is extremely user-friendly. No programming knowledge is necessary. A simple yet comprehensive manual gets you started and is all you'll need to letter hi-res art, drawings, maps, floorplans, etc. Text can be rotated, colored, letter spaced, auto-centered, and selected for direction of reading, all with single keystroke commands. Includes many type styles with upper and lower case letters all proportionally spaced and shows you how you can easily create your own letter styles with the included powerful Font Developer. System Requirements: 48K, Applesoft DOS 3.3, one disk drive, and a Joystick or Koala Pad. Price: $29.95.

Xtrafonts provides an additional 26 typefaces for use with *Graphicmaster* or *Micro/Typographer*. Includes a font display and viewing system. Requires *Graphicmaster* or *Micro/Typographer*. Price: $20.00.

Tid Bit Software, P.O. Box 5579, Santa Barbara, CA 93108, (805) 969-5834.

COMPUTER SECURITY ALARM



Prevent theft without defacing valuable furniture with MicroComputer Accessories, Inc.'s Computer Security Alarm for the Apple *IIe*.

The alarm features a sensitive motion detection circuit which triggers a dual tone siren so piercing and annoying that it is patented. It attaches easily to the back of the *IIe* and prevents access to add-on boards. In addition, the alarm protects the monitor, keyboard, printer, and outboard hard disk drive by locking their cables into the motion detection system.

The alarm package includes two metallic warning labels and two 7-pin tumbler keys for easy authorized relocation. Suggested retail price is $99.00.

For more information on the Computer Security Alarm or a full line catalog, write to *MicroComputer Accessories, Inc., 5721 Buckingham Parkway, Culver City, CA 90230*, or phone *(213) 641-1800.*

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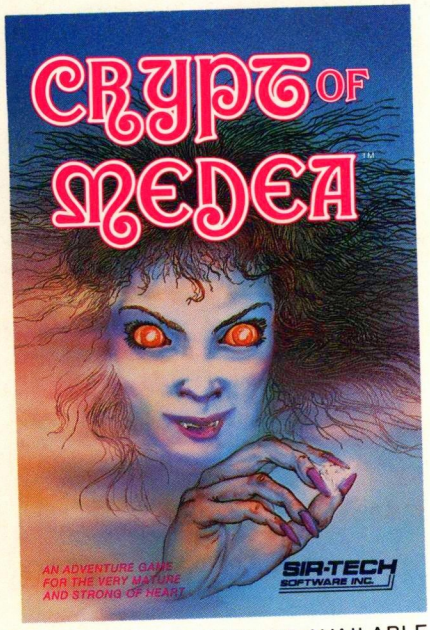

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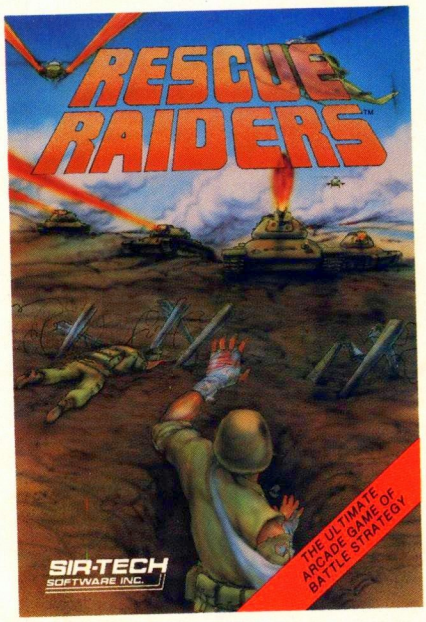

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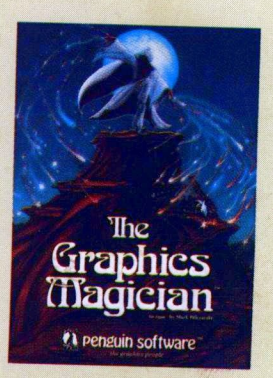

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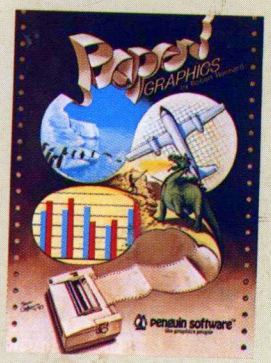

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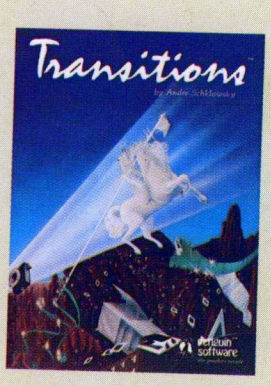

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